THE PSYCHOLOGY OF EDUCATION

DAVID KENNEDY FRASER

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INTRODUCTION

EDUCATION is the modification of our reactions to stimuli in the light of previous experience. The psychology of education is thus interested in the mental processes which are involved in this modification, but it cannot decide the nature of the ends towards which this modification takes place, since they depend on the type of community and society in which the child is to live as an adult, and especially on the ethical and moral code of that society. But practically independent of this ethical end there are certain general laws according to which modification or learning can best be achieved, and it is with these laws that the educational psychologist is concerned.

Before studying the process of modification itself we must first show how we are susceptible to stimuli from our environment, how we can react to these stimuli, how we can retain previous experiences, and finally how we can modify our reactions in certain cases. Thus, the first section is devoted to the relation between heredity and education and the nature of our innate capacities and tendencies. Since there are usually two stages in our response to stimuli, viz. perception and motor reaction, our study of the learning process has been dealt with in two sections—one on perceptual learning and various related topics, and the other on motor learning. In a final section three special topics have been dealt with, viz. the thought process as related to education, a psychological basis for school discipline, and the period of adolescence.

As far as possible the author has tried to keep in mind throughout the layman in psychology, and has thus used the minimum of technical language and everyday experiences as illustrations. In any discussion of the psychology of education there must be a selection of the topics dealt with, and the author has intentionally stressed capacities rather than tendencies, for two reasons. In the first place, they have lent themselves to more exact scientific investigation so far, and in the second place they yield more obviously to treatment by the teacher. Thus, while the scientific investigation of intelligence has recently made vast strides, we are still at the very beginning of a similar investigation of the moral development of the child. The small amount of space devoted to this aspect of the educative process is not due to any sense of its relative importance, but simply to the fact that the amount of scientifically based conclusions with regard to it is so relatively meagre. For a discussion of the most recent developments on the psycho-analytic side the reader is referred to Hingley's " Psycho-Analysis " in this series.

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THE PSYCHOLOGY OF EDUCATION

SECTION I

CHAPTER I

HEREDITY AND EDUCATION

SINCE the material with which we have to work in our educational efforts is the child, or, more strictly speaking, the child's mind, we should obviously inquire at the outset as to the exact nature of the material *before* it comes into our hands. Is it a "clean slate" on which we can write whatever we choose, or an empty jug which we may fill with whatever information we think best? Is it inherently bad, and must all our efforts be directed towards the elimination of this "original sinfulness"? Or again, is it, as some have thought, inherently good, and must we seek to avoid its contamination by the corrupting influences of society? Finally: Are all children born equal mentally? Affirmative answers have been given to all the above questions by various writers, but in the light of modern research they must one and all be denied, because of the influence of heredity. Mentally as well as physically we have been well described as "a bundle of our ancestors." The child's mind is not a clean slate, nor are all children of equal mental endowment, but, long before environment and education can effect development, heredity has had its say as to the final nature of one's mind and intelligence.

In the first place, we inherit, along with other things, a nervous system which is organized in such a way as to render education possible. The detailed discussion of the way in which our nervous system enables us to learn and to profit by experience is given in the later chapters of the book, but a general indication of the various possibilities must be given here. From our present point of view a living being is one who reacts successfully to the various situations which arise in the course of his life, and the control of this reaction rests in his nervous system, which he must naturally inherit. It acts as the connecting link between the incoming messages from the surrounding world or environment and the reactions which he makes by means of his muscular system.

Some living beings at a very low stage are born with a nervous system, which is so built that for every stimulus to which they are susceptible there is one, and only one, reaction possible. If matters are so arranged that this specific reaction is the best one in each case for the conditions of the world in which they live, then such beings would be quite ideal for such a world, and from our point of view education, or the modification of reaction in the light of experience, would be neither necessary nor possible. But if in such a case the conditions of life were to alter in any vital way, then the fixed reactions would no longer necessarily be the best, and indeed they might come to be fatal and this particular species might very soon cease to exist.

At the other extreme a living being might conceivably be born with one nervous system for receiving messages and another for sending instructions to the muscles, but with no ready-made, or even preferred, connexions between these two systems of nerves. In such a case, the only way in which the correct adjustments or reactions could be discovered would be by some laborious process of trial and error ; but, of course, if the individual survived his earliest mistakes he would have the great advantage of modifiability or plasticity of his nervous system to the new conditions of life which might arise. No living beings of this extreme type have survived, but there are many examples of compromise between the two types whereby a certain proportion of the reactions are fixed, while at the same time there is left a considerable degree of adaptability of the rest. It is this adaptability, or the capacity to profit by experience, which constitutes educability, and it is in this way that heredity renders education possible. Mankind is distinguished among living beings of this mixed type by the large proportion of his reactions which are subject to change in the light of experience. Thus men are more capable of profiting by education than any other animals, but they are, at the same time, more in need of education at their early stages, and are thus more dependent in their infancy. Another reason for the higher level of mental development reached by men is the relatively longer period of infancy during which their nervous systems are so much more plastic.

A man must both live and learn. In order that he may live until he learns he must have a certain number of fixed correct reactions to keep him alive. He has certain reflex reactions which are fixed, and in the majority of cases seem to have a protective function.

In addition, he has a large body of fixed tendencies, called instinctive tendencies, which result not in absolutely fixed connexions between sensory and motor nerves, but in connexions which are preferred, i.e. to a given stimulus there is not one unchangeable reaction, but there is one reaction which is more likely to occur than any other unless a deliberate effort is made to inhibit this reaction and replace it by another. These instinctive tendencies for the most part have a direct or indirect bearing on the survival of the individual or the race. They also supply the fundamental incentive for a large proportion of human activity. Since they are capable of change they are somewhat open to the educative process, but the possibility of learning is based chiefly in the other very large group of unfixed connexions which have to be acquired in the course of the individual's own experience.

Heredity does not only provide us with a more or less modifiable nervous system and a set of fixed reactions or tendencies, but it affects the ultimate development of our minds both in quality and in quantity. To make this point clearer; consider for a moment the more obvious facts of physical inheritance. Such qualities as the colour of one's eyes and hair are determined by heredity, and such quantities as one's ultimate size or the limit of one's strength are also fixed by heredity. That is to say that the children of tall parents, or, more accurately, of tall ancestors, will tend to be tall, and children of short ancestry will tend to be short. The exact height to which anyone will finally grow is not determined solely by heredity, but will depend on such factors in the environment as food, exercise, and fresh air. But nevertheless the same environment will have very different effects on the final size of persons from different ancestral stocks. What is really fixed by heredity in any such case is the upper limit beyond which any given person cannot develop. The extent to which anyone approaches the possible limit in his development is determined by the nature of his environment. The same holds true with regard to mental characteristics. As examples of the effect of heredity on quality or kind, we may mention cases of the inheritance of some special ability, such as musical or mathematical talent, and on quantity or amount, general intelligence, speed of thinking, or memory span. The Bach family is an example of the transmission of musical talent, while the Macaulay family, with the outstanding case of Lord Macaulay, is an example of extraordinary memory capacity. On the other hand, the famous, or infamous, Kallikak family[1] investigated at Vineland, N.J., is an appalling record of the possibility of the transmission of a low degree of intelligence amounting in this case to feeble-mindedness.

If we accept this view of the influence of heredity on the general mental level of an individual, it at once does away with any possibility of all children being born equal and thus equally capable of profiting by the same educational opportunities, since no one can deny that there are enormous differences in families in this characteristic of general intelligence. This fact indicates that, until we adopt some systematic means of determining the mental level of each pupil in our school systems, a large part of our educational efforts will undoubtedly be wasted.

The question of the inheritance of acquired characteristics is also of importance for the educator. At present the preponderance of the available scientific evidence is against the direct transmission of acquired characteristics. That is to say that any characteristic which is acquired during the lifetime of one generation is not transmitted directly by inheritance to the succeeding generations. Thus, for example, no matter how long a breeder of terriers may continue to dock their tails in successive generations, he will not be able to produce a race of terriers that will be born with tails already docked. On the mental side, all information is of the nature of an acquired characteristic and is thus incapable of direct transmission by heredity. A good example of this is a specific language. No matter although its ancestors had spoken English for centuries, a child would not naturally speak English if left to its own devices, as in the novelist's favourite situation of a shipwreck on a desert island. Thus in so far as they affect the store of information possessed by our pupils our educational efforts have to begin afresh with each successive generation, and at first we might be inclined to be discouraged by this fact. We might say, " If only we could feel sure that we could begin on the next generation at the place where we left off in this, how much easier our task would be." But this is a short-sighted view, since we are apt to forget that not only the good acquired by the one generation but also the bad would tend to be transmitted, so that we are perhaps just as well off as matters stand.

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[1] See Goddard, Appendix B, 9.

But if no acquired characteristics are directly transmitted, must education deliberately and consciously see to the transmission of the enormous number of customs and traditions that go to the formation of the background of life in a community?

Fortunately there is another factor at work for which unconscious imitation is largely responsible. This is the way in which merely living in a community tends to bring about an unconscious indirect transmission of all its customs, etc. This well-known factor has received the somewhat unfortunate name of "social heredity," since, although it results in a transmission similar to that of heredity, the transmission is indirect and is dependent on the environment in which the person grows up. Whatever we may choose to call it, it is an example of the great power of such an inherent instinctive tendency as imitation, which, although largely unconscious, may act as a very powerful opponent to all our conscious educational efforts.

At the beginning of this chapter we also asked the question whether a child was born good or bad. To this we would answer that the child is born neither good nor bad, but that it has certain inherited tendencies which may lead to good or bad results, according to the particular outlet which is provided for their manifestation. As a very striking example of this, the case of a boy, who was a pyromaniac, may be quoted. This boy had an almost irresistible desire to make things burn, and under ordinary social conditions he had no proper outlet for this tendency, with the result that he found himself before the juvenile court on the charge of incendiarism. He had set his schoolhouse and then his own home on fire; and as they were both built of wood, he probably obtained very satisfactory results from his fire-making point of view. Fortunately for him, he was not dealt with in the ordinary way of being sent to prison for a certain period, only to come out again with a still stronger appetite for fire-making. He was tested and found to be feeble-minded, and was sent to an institution for feeble-minded. Here they recognized the ineradicable nature of this desire for fire-making, and instead of seeking in vain to suppress this tendency, they took the much better course of giving it a legitimate outlet, and at the time when I visited the institution he was a very proud, happy, and useful member of the community, because he was allowed to spend half of each day in the very congenial occupation of tending the laundry boiler fire. The only evidence of his abnormality was that, when he had some special delicacy for supper, such as a piece of cake, he used to save half of it and give it to the fire. This is, of course, a very extreme example, but is a very good indication of the most recent point of view with regard to the question of moral training, which will be more fully dealt with later.

Another point which must be kept in mind with regard to the influence of heredity on the development of an individual is the fact that the effect or effects of any such influence need not be noticeably present at birth, or even in the early stages of the life of the individual. The case of height on the physical side, or for that matter the way in which an individual ultimately matures, are examples of this delay in the effect of an inherited influence or tendency. On the mental side this is especially noticeable in the case of the instinctive tendencies, many of which do not play a very important part in the general mental background of the individual until a fairly advanced stage in his career. Examples of this are the group of primary and secondary sex instincts which only begin to be important at the stage of adolescence or in the "teens." At the earlier stage they are said to be

" latent " or hidden, and at the time of their appearance they are said to be " nascent " or being born. This point is mentioned here in order to prevent a possible confusion between the terms " inherited " and " manifest at birth."

CHAPTER II

INTELLIGENCE AND ITS MEASUREMENT

FROM the point of view of education, one of the most important ways in which the influence of heredity is felt is in the wide range of levels of general intelligence or inborn capacity with which the teacher has to deal in any unselected class of children. A child's actual or chronological age is only a very rough guide as to the real stage of mental development to which he may have attained. Thus, in a group of children between their eighth and ninth birthdays we would find the majority to have the level of intelligence of eight-year-olds, or what is known as the mental age of eight; but at the same time quite a considerable proportion of the children would have a mental age above eight, and probably an equal proportion below eight. Now, from the teacher's point of view, especially where class teaching is in vogue, the mental age of the children in a class is of much greater importance than their actual age. Thus, if any attempt is being made to secure nearly equal progress from all the children in the class, it is much more to the point to have them all of nearly the same mental age than to consider chronological age as the deciding factor in classification.

After a lecture where the author had advocated the classification of children on the basis of their mental age, and had pointed out the great advantages for the teacher in having a homogeneous class, such as would result from grouping fifty boys all of the mental age of ten, a teacher said during the discussion that he did not think that it would be possible to find in the whole of Scotland two boys with exactly the same minds. In consequence, it was obviously absurd to talk of finding fifty boys in the same school with the same minds. To this the lecturer answered that he did not for a moment mean that the minds of all the fifty boys would be the same *in all respects*, but only with regard to the general level of their intelligence. An analogous illustration was quoted by assuming that a group of boys had been put in the same class because they were all five feet in height, with the perfectly obvious consequence that they would still all possess their own individual appearances in general. Of course fifty boys, all of whom are of the mental age ten, will still have fifty different minds as a result of the differences in their ancestry and their environment, which affect their temperaments and the stocks of knowledge available to each, but there will at least be a reasonable degree of probability that they will be able to progress in their studies at approximately the same rate. In this way one of the underlying assumptions of the feasibility of class instruction will be satisfied.

But this question of general intelligence does not only affect the rate of progress to be expected from a child in the course of his school life; it affects even more seriously the ultimate stage of mental development to which the child may hope to attain. Thus there is quite an appreciable proportion of the general population who, no matter how well and thoroughly they may be trained, will never reach to the level of development which is considered normal for an adult. And until this is definitely recognized and allowed for in general educational administration a large part of our efforts, especially in the attempt to extend the school age, will necessarily be wasted.

The magnitude of this problem may be realized from the following table compiled from the results of the examination of 1,726,966 recruits in the American Army between April and November, 1918, as reported in Yoakum and Yerkes's "Mental Tests in the American Army," page 21 :

Mental Age	Totals	Percentages of Total Examined
Under 7	4,744	0·27
7–8	7,762	0·45
8–9	14,566	0·84
9–10	18,581	1·07
Under 10	45,653	2·63

From this table it may be seen that in this representative sampling of the male adult population of the United States, over two and a half per cent. were under the mental age of ten, or, in other words, one man out of forty did not have any higher degree of intelligence than an average ten-year-old child ; and yet this man was expected to live up to the responsibility of an average adult just because, in the eyes of the man in the street, he looked grown up.

How is this so-called mental age measured ? It is of such vital importance for all future reforms in education as to justify fairly detailed consideration at this point.

When a mining engineer wishes to determine the presence and extent of an invisible seam of mineral ore he makes preliminary borings at various points. As a result of these he is able to determine the approximate size and worth of the seam. But this seam will not yield its metal unless it is properly worked. The inborn intelligence of a child may be compared to the seam of mineral ore, and intelligence tests, like borings, show the amount of intelligence present or the limit of achievement to which the child may attain. But just as the seam must be worked so the child must be trained or educated in order to be able to make full use of this innate capacity.

But it must also be remembered that the mere existence of a quantitative scale does not solve all our difficulties, unless we make it practically independent of the subjective estimate of the measurer, i.e. in order to be reliable it ought to give the same, or nearly the same, results when used by different people. As an illustration of the danger of assuming that a quantitative scale is necessarily reliable, we might consider what sort of measurements of height we would obtain if we used an india-rubber scale on which feet and inches were marked, but the exact tension to which the rubber had to be stretched were left to the individual judgment of the measurer.

Until about ten years ago we were only able to use such qualitative terms as very bright, bright, average, backward, and dull when referring to a child's level of intelligence. But in 1908 the French psychologist Binet introduced the concept of mental age. This enables us to express in quantitative terms the stage of mental development which a child has reached, and also provides us with a much more definite basis of comparison between different children or between successive stages in one child. It may be compared to the use of feet and inches in giving a child's height, instead of such vague terms as "tall" and "short." We are also able to state whether a child's intelligence is normal, backward, or superior, and to measure the amount of retardation or acceleration.

The means of determining mental age is a series of intelligence tests which were selected by Binet as a result of many years' painstaking research. Binet himself revised his original 1905 series in the light of further experimental work in 1908, and again in 1911.[1] Since his death, Professor L. M. Terman, of Leland Stanford University, U.S.A., has further standardized the series. In order to do this he applied the original Binet tests and some additional tests to about two thousand children, and finally obtained a series of tests, including six for each age from three to ten, eight at twelve, six at fourteen, and also tests for adults and superior adults. The tests were so placed in the scale that the average child of any given age would test exactly at that age. A child's mental age is calculated as follows: Starting from the age at which he passes all the tests, he is given additional credit of two months for each test passed above that age, and the total thus obtained is called his mental age. Because the difference between the chronological and the mental ages does not represent the same degree of difference in development at different ages, Terman has suggested the use of the intelligence quotient (I.Q.) as a measure of backwardness or acceleration. The I.Q. is obtained by dividing the mental age by the chronological age. Thus, an I.Q. near 1 indicates a normal child, an I.Q. below 1 represents a backward child, and above 1 a bright child.

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[1] See Burt (Appendix B. 2), for a standardization of this scale for London children.

For those who are unfamiliar with the Stanford revision of the Binet tests the following list may serve as a brief indication of the general nature. Anyone, however, who wishes to apply the tests with a view to obtaining reliable results must consult Professor Terman's own book on "The Measurement of Intelligence," both for the standardized form of the questions for each individual test and for the equally standardized method of scoring the child's individual responses and calculating his resultant mental age. This book is a masterly example of the clear explanation in simple terms of the results of an extraordinarily painstaking piece of research work. Those desiring information regarding the results of further application of these standardized tests by Terman and his pupils should consult a more recent book on "The Intelligence of School Children" by the same author, which describes how children differ in ability, how mental tests may be used in classifying school children, and the proper training of exceptionally gifted children.

STANFORD REVISION AND EXTENSION OF THE BINET TESTS

Year III (6 *tests*, 2 *months each*)

*1. Points to parts of body: nose, eyes, hair, mouth.
*2. Names familiar objects: key, etc.
*3. Pictures: enumerates objects.
4. Gives sex.
5. Gives last name.
*6. Repeats 6 to 7 syllables.
Al. Repeats 3 digits.

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Year IV (6 *tests*, 2 *months each*).

*1. Compares lines: length of.
2. Discrimination of forms.
*3. Counts 4 pennies.
*4. Copies square in pencil.

*5. Comprehends simple problems: what to do when sleepy, etc.
6. Repeats 4 digits.
Al. Repeats 12 to 13 syllables.

Year V (6 *tests*, 2 *months each*).

*1. Compares 2 weights.
*2. Names colours: red, yellow, blue, green.
*3. Chooses prettier drawing.
4. Defines by use or better: chair, etc.
5. Problem of divided rectangle.
*6. Carries out 3 instructions.
Al. Knows age.

Year VI (6 *tests*, 2 *months each*).

*1. Knows right and left: hand, etc.
*2. Finds missing parts in pictures.
*3. Counts 13 pennies.
*4. Comprehends harder problems: what to do if raining, etc.
5. Knows coins: 1*d*., ½*d*., 6*d*., and 1*s*.
6. Repeats 16 to 18 syllables.
Al. Knows morning or afternoon.

Year VII (6 *tests*, 2 *months each*).

*1. Knows number of fingers.
*2. Pictures: describes.
3. Repeats 5 digits.
4. Ties bow-knot.
*5. Gives differences: fly and butterfly, etc.
*6. Copies diamond (pen and ink).
Al. (1) Names days of week.
Al. (2) Repeats 3 digits backwards.

Year VIII (6 *tests*, 2 *months each*).

1. Ball and field problem (inferior plan).
*2. Counts 20 to 1.
*3. Comprehends problems: what to do when you have broken something that belongs to someone else, etc.
*4. Gives similarities of 2 things: wood, coal, etc.
5. Defines superior to use: balloon, etc.
*6. Vocabulary, 20 words out of 100.
Al. (1) Knows first 6 coins.
Al. (2) Dictation: See the little boy.

Year IX (6 *tests*, 2 *months each*).

*1. Knows date.
*2. Compares 5 weights.
3. Makes change.
*4. Repeats 4 digits backward.
*5. Sentence with 3 words: boy, ball, river, etc.
6. Gives rhymes for day, mill, spring.
Al. (1) Names months.
Al. (2) Stamps, gives total value.

Year X (6 *tests*, 2 *months each*).

*1. Vocabulary: 30 words out of 100.
*2. Detects absurdities in sentences.
3. Memory drawing of 2 designs.
4. Reads passage and reports 8 items.
*5. Comprehends: what to say if asked opinion of person not well known, etc.
*6. Names 60 words in 3 minutes.
Al. (1) Repeats 6 digits.
Al. (2) Repeats 20 to 22 syllables.
Al. (3) Solves form board like "jigsaw."

Year XII (8 *tests*, 3 *months each*).

*1. Vocabulary: 40 words out of 100.
2. Defines abstract words: pity, etc.
3. Ball and field problem (superior plan).
*4. Rearranges mixed up sentences.
*5. Gives lesson from fable: Hercules and Wagoner, etc.
*6. Repeats 5 digits backwards.
*7. Pictures: interprets.
*8. Gives similarities (3 things): snake, cow, sparrow, etc.

Year XIV (6 *tests*, 4 *months each*).

*1. Vocabulary: 50 words out of 100.
2. Solves induction problem.
*3. Differences between president and king.
*4. Solves problems of facts to explain statements.
*5. Arithmetical reasoning, mental.
6. Reverses clock hands.
Al. Repeats 7 digits.

Average Adult (6 *tests*, 5 *months each*).

*1. Vocabulary: 65 words out of 100.
*2. Interprets fables (Score 8).
3. Differences between abstract words: laziness, idleness, etc.

*4. Problem of enclosed boxes.
*5. Repeats 6 digits backwards.
6. Writes in memorized code.
Al. (1) Repeats 28 syllables.
Al. (2) Comprehends physical relations: path of cannon ball, etc.

Superior Adult (6 *tests*, 6 *months each*).

*1. Vocabulary: 75 words out of 100.
2. Binet's paper-cutting test.
*3. Repeats 8 digits.
*4. Repeats thought of passage read.
*5. Repeats 7 digits backwards.
6. Solves ingenuity tests.

As Terman himself points out, " Merely to name the tests in this way gives little idea of their nature and meaning, and tells nothing of the method of conducting the experiments. In order to use the tests intelligently it is necessary to acquaint oneself thoroughly with the purpose of each test, its correct procedure, and the psychological interpretation of the different types of response."

A general survey of the series of tests as outlined above will enable us, however, to understand some of the general principles underlying the scale.

The figures in the brackets at the head of each year show the amount of credit to be given for succeeding in each test at that particular age level. From III to X there are 6 tests at each year, and thus for each test a credit of 2 months is allowed. Since there are no tests at XI, the 8 tests at XII must represent a total of 24 months, and thus receive 3 months' credit each. Similarly the 6 tests at XIV represent 24 months, and are each credited with 4 months. The tests at the " average adult " stage are given 5 months each, and at the superior adult 6 months, and although this may be somewhat arbitrary it is justified by the fact that ordinary adults test at the " average adult " level.

A rapid survey of the tests at once convinces one of their great variety, since they include both linguistic and non-linguistic tests, memory tests, and tests involving the use of imagination; also tests which are to a certain extent dependent on training. Many of the individual tests have been subjected to severe adverse criticism on theoretical grounds, but even some of those most severely criticized have shown quite a high degree of correlation with general intelligence as measured by the complete series. It must always be remembered that no single test is being advocated as a means of diagnosing general intelligence, but that the whole series must be taken into account. Some of the tests are found to correlate more highly than others with general intelligence. Thus it has been found that repeating digits backwards correlates more highly than repeating digits forwards, or, in other words, intelligence would seem to play a greater part in the former case. In each individual test there are other factors than intelligence, such as memory, imagination, attention, or the like; but as long as intelligence is involved to any considerable extent, then the result of the series as a whole will indicate the presence of this factor.

It may be as well at this point to indicate what we mean when we speak of general intelligence. According to Binet, it involved the thought process as follows: (1) In its tendency to take and maintain a fixed direction; (2) in its ability to adjust itself to attain the desired end; and (3) in its criticism of its own performance. We may compare with this the definition given by Stern,[1] who says that " Intelligence is the general capacity of an individual consciously to adjust his thinking to new requirements: it is general adaptability to new problems and conditions of life." The fact that it is general distinguishes it from talent, which is capacity along some specific line. Its connexion with "new" requirements distinguishes it from memory, which is chiefly concerned with the preservation and reproduction of the old. Stern further distinguishes intelligence from genius in that intelligence is dependent on the occurrence of something new in the environment of the individual, while genius can spontaneously create the new and then make the necessary adjustments.

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[1] Appendix B, 24.

According to Binet's definition, one of the most characteristic features of the reactions of feeble-minded individuals to the new situations represented by the various tests is the way in which they are quite satisfied with their responses however inadequate they may be, and thus show a marked lack of any self-criticism. The fact that memory is distinct from intelligence is shown by the frequent occurrence of individuals who, although quite definitely feeble-minded, may still have a remarkably large memory span and be able to reproduce long series of digits or the like by rote memory. One of the most striking examples of this was the case of the feeble-minded girl who was entirely unable to learn to read any material except that contained in the particular book in which she had learned to read. It was found that she had devised some means of recognizing the general look of the different pages in the book and had memorized the whole of the words on the page, and could reproduce it quite glibly, although she was at the same time entirely unable to tell what any individual word in these pages was. The inclusion of such tests as the

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repetition of a series of digits might be criticized on the score that they involve pure rote memory, but this inclusion is justified by the fact that, on the average, children of the various levels of general intelligence involved tend to be able to memorize about that number of digits, and the results of these tests correlate to a fair extent with general intelligence.

A very interesting suggestion has been made by the late Professor Green in a contribution to a symposium on the question of intelligence. Referring to the fact that as far as intelligence tests are concerned it seems that there is no further development beyond the mental age of sixteen or thereabouts, he suggests that the development of intelligence depends not only on the individual but also on his environment. It is certainly obvious that intelligence could not develop *in vacuo.* The reason why we are able to obtain a measure of intelligence up to the age of sixteen and not beyond is, in his opinion, because the only differentiating factor is the innate capacity of the individual tested, owing to the *relative* uniformity of the environment, i.e. a combination of school and home, in the majority of cases. But after the age of sixteen the types of environment in which further development might presumably take place are so varied that we are no longer faced with only one variable, i.e. the innate capacity, but in addition with the variable of environment, and thus we are at a loss to interpret such differences as may occur, and indeed we have no possible common standard of measurement. While this is a very probable explanation it may be argued, on the other hand, that what we are measuring by means of intelligence tests is something on the mental side which corresponds to the case of height on the physical. Thus, in the case of the physical development of the

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individual, his height increases until about the age of sixteen, and then, although there is no further increase in height, the individual's physical development is by no means at a standstill; on the contrary, many modifications, both for better and for worse, still continue to occur. In view of the fact that the term "intelligence" had already been used in a certain sense by psychologists and others before the advent of tests, it is in a way rather unfortunate that some new term had not been devised for what we seem to be measuring by this means.

With reference to differences in height, we have the exact measure in feet and inches, and also such qualitative terms as tall, short, and even dwarf and giant. But there is no definite line of demarcation between these various classes. Thus, no one would be prepared to say, for example, exactly at what height a person ceased to be a dwarf and came into the class of short people, nor, again, when a tall person was tall enough to be considered a giant. Nor do we have a certain range of heights, where people belong definitely to one class, and then a convenient gap of a few inches, where we have no cases, and then another succession of heights for the next class. In the same way, when we speak of the successive levels of mental development as idiot, imbecile, moron, border-line, backward, normal, superior, very superior, and near genius, we are not speaking of a series of clearly differentiated levels such as the different floors in a house, but of a succession of levels which gradually merge one into another as we proceed up the scale. Thus, the first three classes mentioned, which are usually grouped under the general heading of feeble-minded, do not have any specific characteristic which serves to differentiate them from the normal except a relatively lower stage of mental development. The difference is one of degree and not of kind. The presence of a class for border-line cases is a clear indication of the way in which the normal and feeble-minded classes tend to merge into one another at their lower and upper limits respectively. Using the difference between chronological and mental ages as his criterion, Binet considered a retardation of two or more years as an indication of feeble-mindedness in young children, and three or more years for children over ten. Terman considers that " all who test below 70 intelligence quotient by the Stanford revision of the Binet-Simon scale should be considered feeble-minded, and it is an open question whether it would not be justifiable to consider 75 I.Q. as the lower limit of ' normal ' intelligence," and he adds that a large proportion of those between 70 and 75 can hardly be classed as other than feeble-minded. By using the I.Q., Terman does not need to give different measures of feeble-mindedness for the different age levels. Since a child of ten with an I.Q. of 70 would have a mental age of seven, and thus be retarded three years, we see that Terman's estimate agrees with Binet's. With regard to the social effects of feeble-mindedness, Terman makes the following very striking statement in his more recent volume.[1] He says : " We can conclude, then, that on an average two or three children out of an hundred are so poorly endowed in intellectual ability as to render their social competency a matter of extreme doubt." For a detailed discussion of the relation between mental age and social efficiency, see Goddard.[2]

At this point it will be interesting to give a comparison between the quantitative scale based on the I.Q. and the customary qualitative terms. With the caution that the boundary line between groups must be arbitrary, Terman suggests the following classification of intelligence quotients:

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[1] " Intelligence of School Children," page 126.

[2] Human Efficiency and Levels of Intelligence." Princeton University Press.

I.Q.	Classification
Above 140 ..	"Near" genius or genius.
120–140 ..	Very superior intelligence.
110–120 ..	Superior intelligence.
90–110 ..	Normal, or average, intelligence.
80–90 ..	Dullness, rarely classifiable as feeble-mindedness.
70–80 ..	Border-line deficiency, sometimes classifiable as dullness, often as feeble-mindedness.
Below 70 ..	Definite feeble-mindedness.

As an indication of the constancy of the I.Q. as the child grows older the following tables of I.Q.'s obtained as the result of the testing of a group of children by one set of students in 1919, and another set of students in 1921, in the Moray House laboratory in Edinburgh is interesting:

Child	I.Q. 1919	I.Q. 1921	Change in I.Q.
A	122	116	− 6
B	121	114	− 7
C	120	116	− 4
D	117	106	−11
E	116	117	1
F	112	107	− 5
G	112	102	−10
H	110	114	4
I	106	97	− 9
J	99	102	3
K	98	95	− 3
L	96	100	4
M	93	89	− 4
N	92	93	1

These results show an average change in I.Q. in the two years' interval of only five points, and the greatest change of all is only eleven points. This may in certain cases be due to the inexperience of the students, and also to the fact that in some cases time did not permit of an exhaustive test.

The prominence given to the above outline of the Stanford revision of the tests does not signify that this method is the only or the final method of determining mental age, but merely that so far it is the most satisfactory standardized means available. From the general administrative point of view it has one serious drawback, and that is the length of time necessary to make a complete survey of the children of any school system. For such a survey several shorter methods have been suggested whereby a preliminary selection might be made. Thus, Terman himself has indicated a shorter series selected from his own complete series, which would give a fairly reliable indication of the child's probable mental age. The tests which go to make up this abbreviated series are marked with an asterisk in the complete series. But this method would still involve individual examination, and for a first sifting out of the children a method of group examination would be much more practical. There are already quite a number of group tests available, and of course the American Army tests were an example of a piece of research of gigantic proportions on this very problem for use with adults. At present in our laboratory of experimental education in Edinburgh we are trying to work out some form of group tests for Scots school children. One of these is a direct extension of one of the tests introduced by Terman into the individual Binet series, viz. his vocabulary test. This test consists of two parallel series of fifty words chosen by random sampling from a dictionary and placed in order of difficulty as a result of widespread experimentation. The child is given the following instructions: "I want to find out how many words you know. Listen; and when I say a word you tell me what it means." He is then shown the words one at a time, and the experimenter asks him, "What is a gown?" and so on. An exact logical definition is not expected, but the child must show that he is familiar with at least one meaning of the word. Out of the total sampling of 100 words children of various mental ages are expected to know the following proportions: VIII, 20 words; X, 30 words; XII, 40 words; XIV, 50 words; average adult, 65 words; and superior adult 75 words. If only one list of 50 words is used, then only half the above number of words is expected at each age, i.e. 10 out of 50 at VIII, and so on.

In his more recent book on the "Intelligence of School Children" Terman suggests the use of the vocabulary test alone as a brief intelligence scale, using the following equivalents:

Mental Age -	7	8	9	10	11	12	13	14	15	16	17	18	19
Median Vocabulary	13	18	23	30	35	41	46	51	57	62	67	73	75

This will yield a result correct to within one year in about 60 per cent. of the cases and to within a year and a half in 80 per cent. of the cases.

But this still requires an individual examination of about ten minutes for each pupil, and would not be practical with a large class. The problem remains then to devise a satisfactory group test which will give approximately similar results. We have tried various methods without success, but we are at present investigating a method which seems to be more promising. It is an application of the so-called "multiple choice method" to this problem. The actual form of the test is shown in Appendix A, where it will be seen that for each word in one-half of the Terman vocabulary a group of four words is given, and in each case there is one meaning which best fits the first word. (In some cases, where there are two meanings of equal frequency, two correct words have had to be included, but in a final arrangement it would be better to exclude all such words. They are at present retained to keep the conditions as nearly as possible the same as those in the Terman test.) The problem in this case would seem to be of about the same degree of difficulty as in the individual test, since in neither case is an exact logical definition of the words called for, but merely some indication of a fairly accurate knowledge of the use of the word. A previous attempt to arrive at this by asking the children in a group to use the word in a sentence led to hopelessly ambiguous results, as the word was often used in a sentence which was quite correct, but did not clearly indicate the knowledge of the correct meaning of the word, e.g. "He is an *artless* man."

In order to investigate the reliability of this method the following measures will be adopted: (1) The group test will be given to a very large number of children, and the median vocabulary will be worked out for each age. These should stand in some fixed proportion to the medians obtained with the individual test. (2) A selected group of children will be given the test by the group method for the first 50 words and by the individual method for the second 50 words, and thus the two methods can be compared directly on the same children.

(3) A certain number of the children who have been taken for part two will then be given a complete mental test by the whole series, and the accuracy of the group test compared with the fuller individual test.

Even although the group vocabulary test may not prove very reliable as a first measure of general intelligence, it ought to be valuable as a means of obtaining a general survey of the size of vocabulary of the children in a class.

For provisional results see Appendix A.

CHAPTER III

INTELLIGENCE TESTS AND CLASSIFICATION

ONE very interesting result of the possibility of more exact quantitative measurement of mental development is the discovery of the fact that mental traits seem to be distributed in much the same way as physical traits, such as height. Thus, if we take any unselected group of given age and sex and work out a frequency distribution of their heights we find it to be what is known as a normal distribution. That is, if we take a sufficiently large number of cases, who have not already been selected with regard to height in some such way as the recruits from a Guards regiment might have been selected, we may regard this as an unselected group. If we now arrange these individuals in order according to their height, and group together all those whose height is the same, as measured in inches, we shall be able to obtain the frequency with which each height, as measured in inches, occurs in this unselected group of individuals. As we pass from the shortest to the tallest we will notice that at the shorter heights there are only a few cases, but as we come nearer and nearer to the average height of the group we shall find more and more cases at each inch, until, at the average itself, we find the largest number of cases. If we go still further we shall find the number of cases at each inch falling off until we come to a height at which there are practically no more cases, unless we happen by chance to have included a few giants in our unselected group. Another fact that will be noted is that the falling off from the centre as we proceed to the two extremes will be symmetrical, or, in other words, at the same distance from the average in either direction the number of cases will tend to be the same. If we represent these facts on a frequency curve where the various heights are taken along the horizontal axis and the frequencies of these heights are represented vertically, we shall obtain a bell-shaped curve, which is called the "Normal Frequency Surface." Now if we arrange people in a similar way in order of merit according to some quantitative scale of mental capacity, such as the mental age scale, we obtain a similar distribution. The great majority of the cases cluster round the average, and as we proceed either towards the very bright or the very dull we find progressively fewer cases, until at the extremes of idiocy or genius we find only very exceptional cases. Thus, in this respect mental characteristics obey a law which would seem to be almost universally applicable to all phenomena of life. As an example of an unselected group one might take all the children of a given chronological age in any large school system and attempt to group them according to their mental age

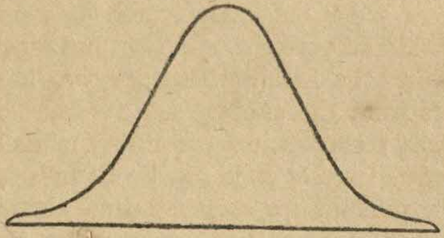

FIG. 1.—The Normal Curve of Distribution.

or their intelligence quotient. In this instance, if the scale had been properly standardized, we should find the largest number of cases at age or with an intelligence quotient of one. Another example of an unselected group would be an ordinary school class of about fifty children who had not been specially selected from any specific fraction of the community, and who had been allowed to progress up the school at a normal rate without undue forcing or holding back. In such a case most of the children would be of the age suitable for that grade and there would be several who were either a year older or younger, only a few would be two years older or younger, and only in very rare cases would children be found whose age was as much as three years from the average age for that class. In the same way tests of scholastic ability made by means of standardized scales such as the Courtis arithmetic tests[1] show that groups such as school classes tend to be distributed more or less according to the normal type of distribution. These facts have an important bearing on the question of the amount and rate of work which should be aimed at with any given class. Thus we might say that the work should be so organized as to suit the capacity of the average member of the class. But in this case the dull children would not be able to keep up and their time would be wasted, and at the same time the brighter pupils would not be having enough work to keep them even moderately busy with the customary results of " idle hands." But if the work is organized with reference to the capacity of the dullards or of the brightest children, we have an even worse state of affairs, since the work would then be a misfit for at least three-quarters of the class. The only successful way out of this dilemma is to revise our systems of classification. Thus, instead of taking chronological age as the first basis of classification, and only making slight allowances for differences in mental age in exceptional cases, it would be much better to take mental age into consideration in the first place and then make any necessary modifications on the basis of chronological age or length of time in school. Of course this would naturally involve the setting up of some scheme for the determination of the mental age of all the pupils in a school system. If further investigation confirm the provisionally established fact that intelligence quotients remain more or less constant during the school life of a child, then in most cases one, or at most two, tests would be sufficient for the great majority of children. Exceptional children, either dull or bright, would have to be tested at more frequent intervals in order to justify the special classification adopted in their cases.

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[1] Harrap.

In view of the fact that it would seem that as a general rule children of the same mental age are capable of the same work in school, and also that the intelligence quotient remains approximately constant, and thus that the brighter pupils will progress more rapidly and the duller ones more slowly, the best way to classify pupils would be the following. In each case determine the mental age of the pupil, and knowing his chronological age deduce his I.Q. Then as far as possible group together in one class children of the same mental age and the same I.Q. This will have two advantages over a system where only mental ages and not I.Q.'s are used. In the first place the children in any such class will be nearly of the same chronological age, and secondly, since they are of the same I.Q. they will tend to progress at a uniform rate, and thus there will not be any need for constant reclassification as there would be under a system based solely on mental age.

Another question which may be dealt with, now that we have devised a more exact and quantitative measure of intelligence, concerns the relative intelligence level of the sexes. If we take the cases of extreme brilliance or genius, it is generally recognized that there are more men who might be included in this class than women, and from this the entirely unjustifiable conclusion is drawn that men as a whole are more intelligent than women. In order to illustrate the futility of this argument let us consider for a moment the other end of the scale. Here it is equally well established that there are more male idiots than female idiots; hence we might just as well conclude that men are of lower intelligence than women. Both cases are examples of the danger of basing any conclusions on extremes, which by their scarcity are bound to be subject to very large chance variations. The question of the relative degrees of intelligence of the sexes can only be decided by studying a sufficiently large representative sampling of all degrees of intelligence in both sexes and finding how such representative values as the median or average man and woman compare with one another. When this is done by means of various tests, only very slight differences are found, sometimes in favour of one sex and sometimes in favour of the other. Thus the only conclusions that can be drawn from such statistics are (1) that any difference which may be shown between the average level of two sexes is quite insignificant when compared with the differences within the sexes themselves, and (2) that the supposed superiority of men based on the study of extremely high cases is due not to any general superiority of men as a class, but rather to the fact that the range of intelligence from the brightest to the dullest is greater in men than in women. This also explains the state of affairs at the lower end of the scale.

Even although this conclusion may have been reached with regard to adults, the question must still be asked as to whether the rate of development is the same for boys and girls. Take, for example, the analogous case of growth in height. Here the girls outstrip the boys for a time only, to be ultimately overtaken and at the adult stage quite definitely left behind. There would appear to be some slight differences similarly in the rate of mental development, but when compared with the very much greater differences between the brighter and the duller members of the same sex and age they are quite insignificant. Thus there is no evidence which would justify the separate classification of boys and girls either on the basis of a difference in innate capacity or of a difference in the rate of development at various ages. Of course this does not entirely settle the question of co-education or separate education of the sexes, since the nature of their probable ultimate career must also influence the type of education which shall be given. If it is likely, or if it is considered best, that men and women should be definitely limited to different spheres in adult life, then, even though their innate capacity and rate of development were the same, it would be necessary to outline different schemes of training for them and to teach them in separate schools or classes. But even with reference to the ultimate career of men and women the present-day tendency is all in the direction of sex-equality rather than sex-discrimination. The other factor of the influence of the one sex on the other in co-education will be discussed elsewhere.

Those who are interested in the application of the results of intelligence testing to practical problems of classification in schools will find a general discussion in Terman's "Intelligence of School Children."[1] But a few specific instances from the author's own experience may throw some light on the possibilities.

The first case was that of a boy of ten who was a source of difficulty in the second grade in an American school. He had spent two years with but little profit in the first grade along with the seven-year-old children, and had then been promoted to the second grade, where he had spent two more years along with eight-year-olds. The puzzling feature in his case was that he showed such isolated signs of profiting from instruction as a knowledge of a large part of the multiplication table, without, however, any ability to apply this knowledge. At last his guardians resolved that he should be tested, and he was accordingly sent to the laboratory where the author was working. An hour's investigation soon showed the reason for his backwardness, and also for his apparent progress in certain specific directions. He passed all the tests for III and IV, and failed in every test for higher ages, with the exception of some of the rote memory tests, where he was even a little in advance of his own age. The practical solution of this case was the consignment of the boy to an institution for feeble-minded, where we saw him later as a much happier child, who was being given work suited to his stage of mental development.

Another boy of ten was sent to us for investigation because he was a constant source of annoyance in the class by teasing the other boys when he should have been doing his lessons. When tested he turned out to be mentally about XII, and when our suggestion that he be immediately promoted to a higher class was carried out it was found that he gave no more trouble, since all his energy was taken up by doing the work of the class. He thus no longer had " idle hands " to fall into mischief.

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[1] See also Terman et al., "Intelligence Tests and School Reorganization." Harrap, 1923.

We have found many similar cases in Scots schools. Thus one boy in the first class out of the infant room who was reported for deficiency in arithmetic was found to be generally backward in intelligence, and a number of similar difficult cases in schools have had the same explanation. One boy, however, who was suspected of being backward, actually tested ahead of his age, and his case was at once diagnosed as one of laziness, and when action was taken in accordance with this diagnosis an immediate improvement was noted. Another boy of nine and a half, who was found in a class of seven-year-olds, and who was naturally suspected of being mentally retarded, actually tested out at twelve and a half. The explanation of his case was that his parents were of a roving profession and the boy had never had any continuous period in one school system, and as a result was very backward in the mechanics of reading and had been classified on this basis. Our suggestion that he be promoted at once and given special coaching in reading was never followed out, because in the meantime the parents moved on somewhere else, and this exceptionally gifted boy is probably wasting his time over and over again in the various schools to which he is never becoming adapted. The class in which this boy was found also contained a boy of mental age five and a half, and thus one teacher was trying to teach a group of children where the difference between the brightest and the dullest was seven years of mental development.

It is little to be wondered at that teachers sometimes become desperate under such conditions. They are always complaining that classes are too large, and asking for smaller groups, which are at present almost impossible because of the shortage of teachers entering the profession. If they were to ask instead that the classes be graded more in accordance with mental age they would be able to achieve much more satisfactory results without any diminution of the size of their classes.

An illustration of the need of special provision for the exceptionally gifted child may be quoted here. A boy of eight was found when tested to have a mental age of twelve, and it was not surprising that he found the work of a class of eight-year-olds rather a bore. Since there was no special provision in the city school system for such a boy, the experiment was tried of putting him into a class with boys of his own mental age, but this proved hopeless, since, although his intelligence was that of a twelve-year-old, his general character was more that of an eight-year-old. In ordinary terms he was still rather a baby when compared with his new classmates, and they, being boys, were not slow of finding it out and rubbing it in. The result was that it was impossible for this boy to stay in a class which was doing the type of work for which his intelligence qualified him, and the only solution of the problem at this particular stage was to leave the boy out of school for the time being and trust to his omnivorous home reading to look after his education. This reading, by the way, included H. G. Wells's " Outline of History." This boy of eight when asked why a cow, snake, and sparrow were alike (a test at XII) said, after due consideration, that if you went back a sufficient number of thousands of years you would find that they all came from the same animal! In any moderately large city school system there are bound to be a sufficient number of such cases to justify the organization of a special set of classes to deal with them in such a way that they will be working along with children of about their own degree of intelligence, and at the same time approximately the same degree of maturity. Until this is done there is bound to be a considerable degree of wastage.

Since the previous paragraph was written, the boy at the age of eleven was retested and succeeded in passing with the greatest ease all the tests up to and including those for superior adults. This indicates that his superiority at the age of eight was no mere flash in the pan, but represents actual innate superior ability which is continuing to develop as such. It is also interesting to note that, as was expected, the discrepancy between his chronological and mental ages is increasing.

CHAPTER IV

INSTINCTS, DISPOSITIONS, AND INTERESTS

FROM the pure psychologist's point of view there are still a large number of very interesting problems to be solved as to the exact nature of instinct and instinctive tendencies, but from the point of view of the educator it is sufficient to know that instinctive tendencies are inherited, and are further relatively fixed and only to a certain degree subject to control and modification. In the third place, they are of great importance to the educator, because they are the chief incentives to action, and consequently to learning, in the child.

If a human being be for the moment compared to a ship at sea, then the currents of the sea and the trade winds may represent the traditions and customs of the society in which he lives, while the engines and propeller of the ship would represent the instincts which serve to drive or urge him on, and finally the captain on the bridge and the steering mechanism might represent his intellect. Thus the chief purpose of the instinctive tendencies is to supply the primary motive power in the mental life of the individual.

As long as a teacher is quite aware of the enormous power and influence of these tendencies in the life of the child, then none of them need be an interfering factor acting against the efforts of the teacher. But if the teacher forgets to take them into account, and more especially does not see that they are given a proper outlet in the activities of the child, then he may find even the best laid schemes of education going astray. None of the natural instinctive tendencies of the child lead *necessarily* to bad or antisocial activities, unless they are deprived of a proper outlet.

A very good example of the way in which an instinctive tendency may counteract the deliberate and conscious efforts of a teacher is the case where the teacher gives instructions of one kind, but at the same time does not carry out these instructions himself, with the result that the child's inherent tendency to imitate is called into play and makes him do, not what he is told, but what he sees others do.

We shall not attempt here to discuss the nature of instincts nor to give a full list or classification of them, but shall confine ourselves to the discussion of a few of those which are of especial importance to the teacher.

Some of these inherited tendencies play such an obviously important part in our lives, and are also usually accompanied by such definite and outstanding emotions, that they have been recognized by every one and have thus been named in everyday language. But there is a very large group of equally important inherited dispositions in our nervous system which, although they have no specific and easily recognizable accompanying emotion, and hence no specific name, are nevertheless constantly functioning as determinants of our actions. They are probably represented in our nervous systems by greater ease in the passage of impulses from certain incoming nerves to corresponding groups of outgoing nerves. As a result we have certain preferred types of reaction to given stimuli. When these stimuli occur the most likely thing to happen is that the impulse will seek the line of least resistance along these preferred paths, and, just as in the case of acquired preferences due to habit-formation, this whole process is likely to occur without our being very definitely aware of it, or, in other words, we shall have an apparently unconscious determination of our actions. A large proportion of the supposedly very mysterious unconscious control of our actions is probably due to the perfectly natural and easily explicable functioning of these anonymous but very important innate dispositions.

In the first place, there is the primary emotion of fear, with its accompanying impulse to flee or to inhibit all action. The place of fear in moral training and discipline is discussed elsewhere (see Section IV, Chapter II). But the fact that it results in inhibition or negation of action shows that it is not a good tendency to employ save as a last resource.

One of the greatest incentives to intellectual activity is the instinct of curiosity, and if the child is led properly at the time when he is a "walking interrogation mark," and more especially if he is given the opportunity to find out things for himself, an excellent beginning will have been made in the development of intelligent thinking and progress. Here again the teacher's duty is not to repress the natural curiosity of the child, but to see that it has the proper outlets, and then to leave the child as much as possible to himself to learn by his own activity.

Although curiosity is the main agent in arousing mental activity, the greatest instinctive factor in the actual learning process is imitation. In order to realize what a short-cut this supplies in countless ways in the course of teaching and learning, the following exercise is recommended. Try to work out a set of instructions whereby you could teach anyone to walk (assuming that they could understand the necessary language) in a case where they had never seen anyone walking and you were not allowed to show them how to do it. Even such a simple everyday activity as this would be almost impossible to teach and learn were it not for the fact that imitation played such a large part in the process, and it is the same with practically every form of skill. One peculiarity of the imitative tendency is that it is especially strong in the case of any new experience. This may be one explanation of the relatively greater activity of a child. So many more of his experiences are new to him than in the case of the adult that this stimulus to his imitation acts much more frequently. Thus we find a child attempting to imitate everything from a grasshopper to a locomotive. The fact that the sight or merely the suggestion of some hitherto unknown " stunt " will immediately result in an almost irresistible desire to try and do it, even in the case of adults, shows that this tendency is not confined to childhood, but merely that the opportunities for its exercise are considerably reduced for the adult because such a large proportion of his surroundings are familiar.

The nature of the imitative tendency is not the same in all stages of the child's development, but there are at least five different forms of imitation which are " nascent " or come into prominence at different ages. They are (1) reflex, (2) spontaneous, (3) voluntary, (4) dramatic, and (5) idealistic.

Reflex imitation is the first form to appear, and is present practically from birth. In this case some reflex action is made not because of the presence of its customary stimulus, but merely because the action is being made by someone else. Thus, for example, a baby usually cries because something is hurting it, but it is quite as likely to cry in the entire absence of pain simply because it hears or sees another baby crying.

Spontaneous imitation does not as a rule occur before about the sixth month. It differs from reflex imitation in the fact that the actions imitated need no longer be confined to reflex actions. Thus a child hearing a certain word may make a more or less successful attempt to imitate the word, or at an earlier stage may attempt to imitate some relatively simple form of action, e.g. clapping hands or shaking head, etc. But at this second stage of imitation there is in no case any idea of the purpose of the action, nor of trying to attain the same purpose as that of the person imitated.

Voluntary imitation resembles the previous form in the imitation of some word or action, but now the purpose of the action is understood, and the aim of the imitative action is to achieve the same end. Thus in the previous case the child might attempt to imitate the action of shaking the head without any intention of indicating negation, but in the present case the child would intend to satisfy the same end as that of the person imitated. This form is nascent at about the second or third year.

Dramatic imitation plays a very large part in the activities of young children. It appears definitely at about the age of three and increases up to about seven. The distinguishing feature of this type of imitation is the large and necessary part played by the imagination. The action imitated is no longer more or less immediately present, and, what is more to the point, the means adopted to carry out the action are usually of a " symbolic " character, and are quite often very far removed from the actual means employed in the original actions. Thus a child will play at riding horse on a broomstick, or driving a car or train made up of chairs, or in more elaborate cases will deliver a sermon of nonsense syllables over the back of the dining-room arm-chair, or will conduct school with a set of dolls or even with a row of empty chairs. In this last case there seems to be a preference for an imaginary class rather than a class made up of playmates. The explanation of this is probably due to the fact that the child has less difficulty in maintaining its position as the teacher or supreme being in this particular situation. More and more use is being made of this type of imitation as its strength begins to be realized. An example of this is the acting out of historical incidents in such schools as are described in Caldwell Cook's "The Play Way." A large proportion of our reactions in conformity to convention are quite unconsciously based on this dramatic imitation, as are also a large number of the ways in which we play our expected part in our professional life, e.g. the lecturer's, the lawyer's, or the doctor's "manner."

Idealistic imitation is the latest form to appear. It does not as a rule play a prominent part until the stage of adolescence, or the "teens." In this case the actions of the individual are to a large extent controlled by the supposed actions in similar circumstances of some concrete or abstract person whom he has set up as an ideal. This is one of the main reasons why a schooling which stops before the critical stage of adolescence misses one of the greatest opportunities of implanting ideals in its pupils, which may serve as driving forces in their after-life. With regard to the choice of ideals by children, it is found that in the first place they tend to choose ideals to imitate from their immediate environment, but at a later stage they go to literature and history for them. This latter method has one advantage, since there is considerably less likelihood of a boy or girl discovering that their supposed ideal is not ideal in every respect, with a consequent period of discouragement, possibly leading to absolute scepticism. Recognizing the fact that children at a later stage tend to choose their ideals from their reading, some teachers are now introducing biographical sketches of great men in other walks of life than the political and military. Thus, interesting details are given about the lives of famous scientists, inventors, artists, doctors, etc., in order to widen the field of choice for children's ideals.

The prominence of the idealistic type of imitation at the adolescent stage provides the teacher with a new and very powerful aid to discipline, but great care should be taken not to make use of it at an earlier stage, as children are very liable to resent it, and indeed at all stages it must be very tactfully used. The case where one young child is held up as an ideal in any respect to one of his playmates is not fair to either of the children involved.

In considering the above stages in the development of imitation as successive we must remember that, although they become prominent at the ages mentioned, it does not mean that the earlier types die out. On the contrary, all the types when once they have appeared continue to be active throughout the course of the person's life. Thus in the adult we come across cases of all types of imitation. As an example of the reflex type we need only remember the irresistible desire to cough when anyone else in a large audience at church or elsewhere coughs, even although we had up to that moment felt no need for coughing. A large proportion of the actions due to so-called crowd psychology is based on the second type of imitation. Very often people imitate one another in crowds without having the slightest idea as to the why and the wherefore of their actions. This type of imitation is also the main source of local dialects and peculiarities of pronunciation. The higher types are active nearly all the time in the life of the adult, and form one of the short-cut methods of solving many of the problems with which we are suddenly faced.

The old adage, " Practise what you preach," recognizes the strength of this imitative tendency from the teacher's point of view, and is the best motto for the teacher who wishes to secure this innate tendency as an ally instead of an opponent. Another type of instinctive activity which most teachers are apt to regard as an opponent is the play activity of children ; but here again it is merely a case of securing the proper outlets for the activity, and instead of hindering the educative process it will prove the greatest aid in arousing the interest of the children. For a detailed discussion of ways in which this instinctive tendency has been made use of in actual practice the reader should consult Caldwell Cook's " Play Way," in which he describes a number of ways in which an educative use was made of the boys' tendencies to play.

One of the most noticeable differences in the general mental make-up of the young, as contrasted with the adult, is the large proportion of its activities which are prompted by the play attitude. Play and work cannot be distinguished on an objective basis in accordance with the specific nature of the activity itself, but must rather be distinguished on a subjective basis in accordance with the mental attitude of the individual who is carrying on the activity. Thus if a person or animal carries on any form of activity purely for its own sake and does not use it as a means to some further end, then it may be said to have the play attitude towards that activity, but as soon as the activity is thought of as a means to an end outside itself then the person has the work attitude. Many activities which are considered as play from the everyday point of view must be looked upon as work from the psychological point of view, and vice versa. Thus any game which is pursued from a professional point of view must be considered as work, and on the other hand much very elaborate scientific research, especially in the so-called pure sciences, is carried out under the play attitude, where the person tries to solve the most elaborate problems just "for the fun of it."

Now, since a very much larger proportion of the child's natural activities are carried out in the play spirit, it is obvious that this attitude must be of educational importance, and it has received widespread attention from educational psychologists. There have been several interesting attempts to explain its greater prevalence in the mental life of young animals. Thus G. Stanley Hall[1] considers the play of young animals as a manifestation of the operation of a more general law, which he calls the law of recapitulation. According to this law all the successive stages in the mental development of the young individual are a recapitulation of the various stages in the mental development of the race, and thus, for example, boys of a certain age delight to play at Wild Indians because they are at that particular stage in the mental development of the race. But however suggestive this theory may be, it is difficult to justify fully, and is a dangerous case of reasoning by analogy from the physical development of the embryo.

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[1] Appendix B, 11.

Another theory to explain the great play activity of the young is called the " Surplus Energy " theory. According to this theory the young animals are still dependent on their parents for the necessities of life, such as food and shelter, and since they do not require to use up their energy in seeking for these necessities they must have a large surplus of energy which they work off in play. But one fact that seems to refute this explanation is the case of animals, who play on long after they have used up whatever spare energy they may have and are only compelled to stop when they reach a stage of complete exhaustion.

Still another theory explains play as a form of practice and preparation for the more serious business of adult life. This is the theory advanced by Groos in his very interesting special studies of the problem. If this theory is accepted, it naturally follows that play is one of the most important factors in education. To illustrate it we may consider the difference between the cases of two puppies playing at fighting and two dogs actually fighting. In the former case the puppies are carrying out and practising all the various complicated movements of attack and defence which are required in fighting, with this very significant distinction—that failure to choose the correct response or undue slowness is not penalized by the same disastrous results which would accrue in actual serious fighting. If such preparation under relatively sheltered conditions were not possible it is difficult to see how any young animal would ever succeed in surviving its first serious encounter. Thus play, instead of merely being something which the teacher has to seek to confine within its supposedly proper limits, i.e. out of school hours, is in reality one of the most important factors in the child mind both from the biological and the educational points of view.

When we say that due allowance should be made for the innate play tendency in education we do not mean that education should be made up of games, nor that the child should be continually amused, but that the play attitude should be in some way stimulated towards what might under ordinary circumstances be considered work. An extreme form of this change of attitude is illustrated in cases where something which might be considered drudgery is made to appear a privilege. Mark Twain's description of the way in which Tom Sawyer got his chums to pay for the privilege of painting the fence is a very good example. In a certain institution for the feeble-minded the washing of the floor of a room is allotted as a special privilege to one girl, and if she does not do it properly the work is taken away for a day or two, with the result that she takes care in future to continue to deserve the privilege. Another result of the establishment of the play attitude towards school as a whole is that children, instead of being glad when the afternoon bell rings and still gladder when the holidays come, are actually sorry at these times. Also, they no longer require to be driven at their work, but the only danger is that they may overwork. A description of several experiments along these lines may be found in Miss Alice Woods' "Educational Experiments in England."

The effect of the appearance of the primary and secondary sex instincts, including the gregarious and migratory instincts, will be discussed later in a special chapter on the psychology of adolescence.

Another instinct which might well be made more use of for educational purposes is the collecting instinct, which is exemplified in the various collections, such as stamps, eggs, butterflies, and the like, which practically every one makes at one or more stages in his life. This tendency could be employed either directly in learning about the particular material collected or indirectly by using this particular interest as a lever to promote interest in some other branch which it was considered advisable to emphasize. Thus stamp collecting might be made a starting point for the study of geography with a child who had previously shown no interest in the latter subject. Or, in this case, we might again apply the method of providing the proper outlet, and whenever we notice a particularly strong manifestation of the collecting instinct we might suggest some line of interest for collecting which would meet what we thought to be one of the educational needs of the pupil at the time. This collecting instinct leads on imperceptibly to some process of classification, which in turn renders possible some form of generalization and systematization with regard to the material collected. The only care that must be taken, especially with younger children, is that they are not so much taken up with the individual examples as to lose sight of the possible general principles, or, in other words, they may be unable to see the wood for the trees.

SECTION II

CHAPTER I

SENSATION AND IMAGE

HAVING dealt with the main points of connexion between heredity and education, we now propose to discuss the educative process itself. In the first place, we must give a detailed account of the learning process in its various aspects. Because of the two aspects of perceptual and motor learning it will be necessary to divide our discussion into two sections, in the first of which the main emphasis will be on the perceptual side and in the second on the motor side. Thus in this section the following topics will be discussed: sensation and image, attention, perception, imagination, perceptual learning and memory. In the following section such topics as reaction, motor learning, habit, and the general results of the learning process will be dealt with. A final section will deal with some more general aspects, such as the connexion of the thought process with education, and a psychological basis of a sound method of discipline in the schools.

Education is a process of profiting by past experience, by means of adapting or adjusting our reactions to given situations in the light of the effects of previous reactions. But before we can make these right or wrong reactions we must have some means of receiving stimuli from the world around us. For this purpose we are provided with various sense organs, such as the eye, the ear, the tongue, the skin, etc., and also with ingoing nerves, which transmit the messages received by these organs to more or less elaborate clearing houses in the spine and the lower and upper brain. In these centres the incoming messages are relayed on to the appropriate outgoing nerves, which in turn stimulate the proper muscles to react. For a fuller discussion of this " sensori-motor arc " the student is referred to any of the standard elementary psychology textbooks. In this section we only propose to discuss the educational bearings of the psychology of sensation.

We usually speak of the five senses—seeing, hearing, tasting, touching, and smelling. Psychologists have discovered that our senses are not limited to five. In the first place, they divide touch sensations into those of pressure, heat, and cold. They also distinguish a separate sense of balance located in an organ near the ear. Sensations of the position and movement of the various parts of our body are also distinguished under the name of kinæsthetic sensations. These play a very important part in telling us the nature of the reactions we have made in response to any given situation, and are thus of great importance in education. Almost entirely independent of the above nervous system we also have the sympathetic nervous system, whereby our organic reactions are controlled.

Most of our sensations are developed to an acuity, or sharpness of discrimination, in early life, far in advance of the requirements of everyday usage. With a child of school age the acuity of the senses is not capable of further development by training, and thus whatever else is meant by a sense training, it cannot refer to an actual increase in acuity by training.

Before discussing sense training it may be well to point out the most important ways in which sensory defects may influence the educability of an individual. For example, in the case of sight we may have total blindness, blindness in one eye, short-sightedness, or far-sightedness, astigmatism, squinting, or colour blindness. All these defects have a more or less serious influence on the child's capacity to learn, and only the first is apparent without special investigation. All the other cases are liable to occur in an ordinary class. Total blindness calls for such special treatment as to justify the provision of special institutions for the training of the blind. Some of the other defects, such as short-sightedness, far-sightedness, and astigmatism, may be remedied by the use of proper glasses, and thus their interference with the child's education may be removed. Blindness in one eye, while not sufficient to justify placing a child in a special school, will nevertheless constantly interfere with his progress by depriving him of the principal means of perceiving depth and relative distance by sight. A pronounced squint or any marked difference in the functioning of the two eyes may lead to a neglect of the sensations received by one of the eyes and result in what is known as psychical blindness in this eye. In such a case the child will have the same difficulty in estimating depth as if it were actually blind in one eye. This difficulty is intensified in the case of moving objects, and such an action as the catching of a ball or hitting a tennis ball in flight is almost impossible. Colour blindness is inborn and cannot be removed by any form of training. It must not be confused with inability to name colours, which may simply be a case of weak association between the colours and their respective names, but it is indicated by the lack of capacity to match certain colours, and especially to distinguish between reds and greens. About one boy in every fifty is colour blind, and about one girl in every two hundred. A most striking example of the detrimental effect of this defect was shown in the case of a university student, who, not knowing that he was colour blind, specialized in chemistry, and only discovered his unfitness for this study when he came to practical laboratory work and found himself unable to discriminate between the colours of the precipitates. Had he been made aware of his defect by the very simple test necessary he would not have wasted a year of his time of study.

In the case of hearing, stone-deaf children are dealt with in special institutions, but fortunately for them it is no longer considered inevitable that they should be both deaf and dumb. The modern methods of teaching them to speak and lip read are of great social value to them, since they are no longer restricted to verbal communication with those who are familiar with the special sign language they used under the old methods. Partially deaf children are often erroneously assumed to be stupid, and unavailing attempts are made to teach them, when a simple remedy of placing them near the front of the class with their better ear towards the teacher might entirely remove the source of the difficulty.

Although special deficiencies in the other senses would not have such a generally retarding effect on the child's development, they may nevertheless be at the root of a child's lack of capacity in some specific subject, or group of subjects. On the other hand, an especially acute sense may be at the basis of some special talent, as, for example, smell and taste, in the case of a tea taster.

Since our sensations are the only means by which we can realize the nature of our surroundings, and also form the material from which we can later on build up images and ideas, it is obviously necessary for us to have a considerable wealth and variety of sensations. The arguments of some of the more ardent supporters of so-called sense training, if driven to their logical conclusion, might lead to the following absurdity. In order to give the child as many different visual sensations as possible one ought to have as many different shades of colour as possible in his usual surroundings, e.g. on the walls of his nursery. In this way there is no doubt that the child's retina would be exposed to an enormous variety of colour sensations, but there would be little educative effect. In order that an experience may be educative, i.e. may influence future experience, it must be reacted to by the child in some way. And to be fully educative this reaction should be in connexion with some felt need of the child. Thus, for example, the matching of colours is educative because the child is reacting to them in some definite way. But if the child is merely sorting out a variety of colours because he has been told to do so, he will not learn as much as he would if this process were being carried out with a view to solving some problem of his own, as when a child attempts to paint the drawing of a landscape to match the colours of nature. Any attempt to isolate the sense training of a child from his other activities is pedagogically unsound. This fact has also been stated in the words "no impression without expression."

Since kinæsthetic sensations are not included in the familiar five senses, it will be advisable to give one or two illustrations of their occurrence before proceeding to discuss their educational significance. Even if we close our eyes and move our arm or any other part of our body we are able to say what sort of movement we are carrying out without actually seeing the movement itself, and in the same way unless the necessary nerve centres are deadened, as in the case of our arm "going to sleep," we are always capable of telling with a fair degree of accuracy in what position any of our limbs may be. Further, in the case of so-called passive movement, where we do not move our arm ourselves, but it is moved by some outside agency, we are still aware of the nature, and to a certain degree of the extent, of the movement. These three types of awareness of position, and of active and passive movement, are brought to our consciousness by a specialized set of nerves, situated for the most part in the joints and sinews. The sense of balance of our body as a whole, on the other hand, is given to us by means of a special organ near our ears, and is responsible among other things for the disagreeable feelings which we have when an elevator starts suddenly. Indeed, one peculiarity of this organ of balance is that it registers change of movement or acceleration, and not uniform motion.

When the child reacts to a given sensation his reaction usually involves some form of movement, and this movement gives rise to kinæsthetic sensations, and the memory of these sensations in the form of images acts as a guide to his reaction on a future occasion. Thus he is able to profit by experience. This point will be further elaborated when the process of meaning-formation is discussed, but even at this stage it is interesting to note that this group of kinæsthetic sensations which are not included in the usual list of the five senses is nevertheless one of the most important, if not indeed the most important, group of sensations for the educative process of adaptation. Their existence and essential value for the educative process is at the basis of all the theories which advocate the self-activity of the child as a vital factor in the educative process.

Another peculiarity of these kinæsthetic sensations, or sensations of movement, is that they do not develop all at the same rate. Thus, the young child has a much more highly developed sense for large movements at an early stage than for the finer movements. In other words, he has a finer sense of arm movements than of wrist movements, and so on down to finger movements. From this we may deduce the pedagogic rule that in the early education of the child we should proceed from larger movements to smaller ones. This very fortunately agrees with the precautions which should be taken with regard to the eyesight of the young child. It at once condemns any of the methods of teaching young children fine sewing and similar fine work at early stages. In such subjects as writing and drawing it also indicates that we should proceed from large movements on blackboards or the like to the smaller movements involved in writing in books.

The importance of these sensations of movement would also seem to indicate that in cases of particular difficulty in the acquisition of some form of motor skill, such as writing, for example, the child's attention might be deliberately drawn more to these kinæsthetic sensations and not so much to the visual sensations of seeing the original and his attempted copy. One very successful method of piano teaching has shown that one of the fundamental principles underlying good playing is that the player must always attend to the feel of the resistance of the key before and during the act of playing each note, and this really means attending to the kinæsthetic sensations involved. If the pupil then also pays attention to the resultant tone, and judges whether it is good or bad, he will then be able to remember the exact kinæsthetic sensations which accompanied the production of the desired tone quality, and will thus be able to choose deliberately the correct form of reaction and repeat it at will on future occasions. If he had not in the first place attended to the feel of the key he would not have been in such a good position to reproduce at will the successful form of reaction, or, in other words, he would not learn so rapidly and surely.[1]

Successful teachers in any form of acquiring motor skill will usually find that they have consciously or unconsciously directed attention to this side of the process, and they would probably attain even better results were they to analyse carefully the movements involved in the particular form of skill, and stress from the beginning the correct form of reaction. This will be discussed in greater detail when we come to the laws of learning themselves.

With regard to images, we need only point out here that they are revived or recalled sensations which have been previously experienced as a result of some external stimulus, but that at the time of their recall the original external stimulus is no longer present. This at once shows that images are impossible without previous experience of the corresponding sensation. Thus anyone who has been blind from birth cannot have any visual images, and, what is more, no normal-seeing person can give them any idea as to what these visual images are like. Persons vary considerably in the fluency, vividness, and nature of their images, but this will be dealt with in the sections on perception and imagination which follow.

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[1] See Matthay, "Act of Touch."

CHAPTER II

ATTENTION

AT any one moment in our lives an enormous number of stimuli from the outer world, and also from our own bodies, are sending messages along the ingoing nerves. Were these all equally insistent, and as a result all equally clear, we would live in a state of perpetual bewilderment and would never be able to make any progress. But fortunately there is a selective process whereby a certain limited number of the total of stimuli are given a greater degree of prominence or clearness in the general field of consciousness, which includes all the sensations present at any given moment. This narrower, selected group of sensations and images constitutes what is known as the field of attention. The whole field of consciousness has been compared to a vast mountain viewed from above, with a collar of cloud around its shoulder whereby the lower portions are shrouded in indistinctness, while the peak, which stands out clearly above the cloud, represents that part of the field which is in the field of attention.

The effect of any sensation or group of sensations experienced is greatly enhanced if it is included in the narrower field of attention, and thus the teacher rightly considers it of great importance to secure the attention of the class to any matter which he desires to be learned in order that it may function in the later experience of the pupils. But it must be remembered that there is a great difference between the compelling of attention by external coercion and threats, which is only too often resorted to, and the much better method of inducing attention by appeal to some of the underlying instinctive tendencies and interests of the pupils.

There have been very many attempts to classify the various forms of attention, but the most useful from the teacher's point of view is that in which we distinguish passive, active, and secondary passive attention. Passive or involuntary attention is illustrated in any case where we cannot help attending. A variety of stimuli call out this type of attention. Thus, any sudden, very intense, novel, or repeated stimulus will compel our attention. Any moving object seems to do so also. All these different stimuli have the factor of biological utility in common. Thus, for example, a moving object is very likely to be a source of danger to us, and it is at least as well that we naturally tend to pay attention to it until we make sure that it does not involve danger. An example of the way in which animals apply this law for their own safety is given by the case of the animal which avoids drawing the attention of a larger animal, or man, which might seek to destroy it, by keeping absolutely still. The teacher may use some of these means for attracting attention, but they will not serve for maintaining it on any subject for any length of time.

One of the means of attracting attention which teachers very commonly use is repetition. Thus, if they do not get a child or a class to attend to a question or a command at the first time then they almost once, in their eagerness for response, repeat what they have said, perhaps in slightly different wording, until they ultimately get an answer. This method certainly succeeds in getting answers sooner or later, but some teachers have become suspicious that they have been unconsciously developing a bad habit of inattention in their classes by this procedure. In some cases where children have been asked why, if they know an answer, they have not given it at the first asking, they have replied that they did not attend to the first question because they knew that the teacher would be sure to repeat it. In order to overcome this habit of inattention to the first instruction some teachers have introduced, with considerable success, a form of special drill where they warn the class that they are going to give instructions once and only once, and the class is then expected to carry them out without further help. As a result the class has not only shown considerably increased alertness at the time of the actual test, but this alertness seems to have carried over into their general work as well. Of course were a teacher all the time to restrain somewhat his or her natural eagerness for quick response, and only ask questions or give instructions once, this habit of inattention would not be formed and the special drill would not be necessary.

The second type of attention is the active or voluntary type. In this case we are always aware of the effort involved in attending, and especially of the ease of distraction. A student who is working at some uncongenial task at a window outside which his friends are playing a game of tennis in which he would fain join, illustrates this form. A new subject may attract passive attention at first by means of its novelty, but when once this novelty has worn off, then some other means has to be found to keep the attention fixed on this subject. When two ideas are competing for the central position in the attentive focus of our consciousness, and it is desired to keep the weaker one there, it is necessary to call up reinforcements, such as associated ideas of the weaker, in order to enable it to overcome the stronger. Thus in the case of the student mentioned above it would very probably be necessary for him to call to mind his probable failure in some examination, or even the effect of lack of concentration on the career which he has set before himself as his ideal. There is a tendency for all subjects to pass through a stage where they can only be attended to with effort, and at this stage the teacher can help the pupil by calling his attention to as many reinforcements as possible. Of course the element of novelty may be again brought into play, even with a familiar subject, by indicating new methods of attack.

But the very best conditions for learning are only present when the third type of secondary passive attention has been reached. In this case something which had been at the stage of active attention, and could only be kept in the forefront of consciousness by the help of reinforcing ideas, has now become so interesting in itself that there is no longer any effort involved in attending to it. Of course the person who is at this stage may put forth a great amount of effort, and indeed usually does, but the effort is expended in working at the problem and not in keeping it clearly in attention. Thus when a boy begins the study of mathematics its novelty may attract his attention, but then he will probably come to a stage where the difficulty of working may be irksome and attention will involve effort. But in many cases certain aspects of the subject, such as drawing curves for equations, may become so interesting that he no longer has to exert himself to avoid distractions, and may become so engrossed that even such powerful calls to his attention as hunger or cold may pass unnoticed, and all his energy will be turned to the solution of the problem in hand. In this case we have secondary passive attention. The stock joke of the so-called absent-minded professor is in reality another example of the absorbing nature of this type of attention. He is not really absent-minded, but is, on the other hand, so "present-minded" to some problem in which he is interested that all the other details of everyday life to which mere ordinary people attend have no chance of occupying his attention.

From the teacher's point of view, the difference in the size of the field of attention at different ages is of very great importance. In this respect the young child is doubly handicapped in comparison to the older child or the adult. In the first place he can only hold about half the number of units in his field of attention at the same time, and in the second place the size of a group which may be grasped as a unit is also much smaller. One practical result of this is that a teacher has to be very careful to divide up any material presented to the child in the way of information or instruction into very much smaller pieces than would be the case for an older child, or, what is more important, for the teacher himself or herself. A simple experiment to show the effect of grouping on the span of attention is one where cards are used with a varying number of dots on them in different groupings. If these cards are exposed for an instant only, some interesting differences are found. Thus if the dots are arranged in a regular sequence without any grouping we soon reach the limit at which anyone can tell with assurance how many dots there are on the card after one short exposure, but if the dots are arranged into groups of threes or more, then the total number which can be definitely recognized immediately increases enormously, and the limit is not as a rule reached until the number of groups is about the same as the number of units in the original ungrouped limit. In such an experiment young children as a rule fall behind adults both with regard to the numbers and the size of groups with which they can work successfully.

The gradual increase of the span of attention with age is an example of one of the cases where natural development should be allowed to act without undue forcing on the part of the teacher, although, at the same time, care should be taken that the children are at least making full use of their available powers.

One way in which this difference in the span of attention is always influencing the teaching process is in connexion with the unit of apprehension of verbal material. Thus when an adult is given any verbal instructions, he usually attends to the sense of the instruction and not so much to the individual words. In this way he is able to select as his unit either the phrase or only one or two of the determining words of the total instruction. Thus he is able to retain and carry out a very much longer set of instructions than if he were compelled to attend to each single word and attempt to retain it. In the case of a child trying to follow spoken instructions, he tends more to rote memory of the actual words spoken and not so much to the general sense, and as a result is compelled to adopt the single word (with the possible exception of such short connecting words as *the*, etc.)

as his unit, and this combined with his shorter span greatly handicaps him in the attempt to carry out long sets of instruction. In the case of longer and unfamiliar words he may even be compelled to adopt the syllable as his unit, and thus there will be an even greater necessity of cutting down the length of the instruction which is given at one time. One everyday indication of this difference is the much shorter sections into which a dictated passage has to be divided for younger children. Many cases where young children appear to be stupid in their inability to follow out apparently very easy instructions are due to the teacher forgetting for the moment the span of the children and giving them too much at one time.

Another difference between children and adults is their relative susceptibility to distraction. Children are as a rule much more easily distracted than adults, as teachers know only too well; but under favourable circumstances children are capable of quite an amazing degree of concentration. In any case where concentration of attention is required on the children's part certain general conditions should be observed. In the first place, the general surroundings of the schoolroom should be conducive to concentration. Thus, for example, possible distracting sights and sounds should be eliminated as far as possible. This unfortunately is usually out of the teacher's control, as it is mainly determined when the school is built, but within these limits certain measures are possible. In the second place, where concentration on one particular aspect of a subject is required, the teacher must avoid the temptation to introduce other aspects, as he often feels inclined to do for the sake of completeness. A good illustration of this danger is the matter dealt with in a beginner's course in any subject.

The lecturer may be quite well aware that there are two or more theories in connexion with some aspect of his subject which are for the time being equally well founded, and for the sake of thoroughness he may feel compelled to state all these various theories, and as a result scatter the attention of the student over a number of different theories which he has no means of weighing relatively to one another. On the other hand, certain lecturers, who are just as aware of the conflict of theories, deliberately adopt the principle of selecting one, and one only, and placing all the emphasis on this one on the ground that they will thus secure the undivided attention of their students to this one, and a partial but positive point of view will result instead of a more complete but at the same time more confused attitude.

One of the most insidious forms of this type of distraction of attention results from the too great emphasis on cautions as to what ought not to be done in any given case. The attention is drawn to this undesirable possibility, and it thus enters the field of competition with the correct reaction in circumstances where it might otherwise never have occurred to the learner, and the instruction *not* to do it, being negative in character, is at best relatively weak, and thus not so likely to be influential in determining later conduct. One of the commonest and most glaring examples of this practice is the custom of pillorying the spelling mistakes made by children in a class by writing the misspellings on the blackboard, with the immediate result of drawing attention to the incorrect spelling and thus giving it an added chance of recurring on some future occasion. If some means of correcting spelling errors is desired, then by all means put up a list of the correct spellings of the troublesome words, but never give such undue prominence to the incorrect spelling.

With regard to the concentration of attention on one subject for a long time, and, on the other hand, the rapid adjustment to frequently changing topics, there are certain characteristic differences, even among adults, and these are such as to affect the individual's fitness for various careers. The two main points of difference are the rate at which anyone can turn his attention to a new subject, and the tenacity with which he can maintain his attention on one and the same subject. Thus an individual who has great powers of sustained attention to one topic would probably make a good research worker in some line for which his other specific talents and interests fitted him. On the other hand, if this were coupled, as it very often is, with a slowness in turning the attention from one subject to another, he would obviously be out of place in some such position as the manager of a large retail establishment, where at all times of the day he would be called upon to deal with the most varied problems at the shortest notice. The determination of these different types at the end of a child's school career by means of a combination of the teacher's observation throughout the child's schooling, with some objective test at or near the end, might quite profitably form part of a scheme of vocational guidance which is bound sooner or later to be adopted in order to prevent the misfits of round pegs in square holes.

With regard to the duration of attention on one topic, children are also as a rule at a disadvantage when compared with adults, and as a result for the the average child the time divisions of the school curriculum have to be made much shorter to allow for this difference in duration of attention as well as for their greater fatigability. But there are, nevertheless, quite a number of children who have what the Americans call a " single-track mind " and become absorbed with one subject at a time, to the complete exclusion of all others for the time being. In an ordinarily organized curriculum such children are a thorn in the teacher's flesh, and are wasting a very large proportion of their time in dealing with subjects in which they have no interest for the time. So long as the curriculum is based on the principle of making children progress at a uniform rate by groups in a number of parallel subjects, such exceptional children are bound to suffer, and they are not by any means a negligible factor in the ultimate intellectual capital of the State, since they are quite likely to furnish the enthusiasts in later life who get things done along the particular line of their enthusiasms. If, on the other hand, the curriculum is organized on a freer basis, with some allowance for the individual interests of the children, then such children, with proper guidance to avoid undue specialization, would in all probability make much more rapid progress. Some of the plans for a modified curriculum, where a certain minimum of set work is required each week and the rest of the time is left to the choice of the child, would seem to indicate the safe golden mean between the two extremes of lock-step compulsion and complete freedom for the child.

CHAPTER III

PERCEPTION

IN a preceding chapter we have discussed in isolation the elementary mental phenomena known as sensations and images for the purpose of clearing up certain current misconceptions with regard to them, but in the actual life of the child these sensations and images never occur in isolation, but are always combined into percepts or ideas. Thus a knowledge of the psychology of percepts and ideas is of much greater importance for the teacher, who, unlike the investigator, has to do with the child as a whole.

Percepts and ideas are both compounds made up of the elements of sensation and image along with a fringe of reaction. The distinction between them lies in the fact that in a percept there are at least some actual sensations, while in an idea there are only images or centrally recalled sensations.

These compounds both differ from the elements of which they are composed, since they in themselves, without any further reaction, represent the adoption of an attitude of some sort towards the situation, and they are thus endowed with meaning and may even fall into the categories true and false. In the present chapter they shall be treated from the structural point of view, as consisting of a grouping of sensations and images in order that the differences between those of children and adults may be indicated, but in a later chapter, where we deal with the process of perceptual learning, greater stress will be laid on the functional aspect.

Percepts and ideas also form the stepping stone between the elementary sensations and images and the higher and more complex thought processes.

In practically all percepts there is a certain proportion of images, supplied from previous experience, and although adults are not always definitely aware of their presence in a percept, they can usually discriminate between what is actually present as sensation and what is added as image. Children, on the other hand, are much more liable to confuse image with sensation, and to maintain that what was only imagined was actually present. This type of illusion leads to a certain form of inaccuracy of report without any intent to deceive, which often goes by the name of "children's lies." If an imaginative child who is particularly prone to this type of misstatement is always being reprimanded, as if he were deliberately telling an untruth, great harm may result; but if every opportunity is grasped of showing him the difference between what is actually present and what he adds from the store of his previous experience, then he may come to discriminate between sensation and image, without undue repression of his imagination. So great is this love of children for the imaginative components of any percept that they prefer to have as little actually given as possible, e.g. they prefer outline drawings where the details may be filled from their own stock of images.

Another feature of the gradual development of percepts with increasing age and maturity is that the child's initial percepts are not few and clear-cut, as some people have supposed; but James's "big, booming, buzzing confusion" is a better description of the initial stages of perception in the child. Thus the process of development is not one solely of increase in the number of percepts available, but is rather one of increase in distinction and classification of the percepts already present in a vague and undifferentiated fashion. This fact is often concealed from the casual observer by the use of words by children with the false assumption that they are using the words to mean the same thing as the adult. Closer analysis almost always shows that this is not the case. For example, a child who sees for the first time a crocus may learn to use the name crocus, and the fond parent may proudly think that the child has definitely got the idea and word crocus into its little head; but if he only watches a little longer he will soon find that the word crocus continues to be used, but with a very much wider application than with the adult. Thus it may happen that at first the word crocus is used as a generic term for all flowers, or, if not in quite such a generalized sense, it will at least stand for all small flowers growing near the ground. Only gradually will the use of the word be restricted to its own proper object as a result of quite considerable experience with a variety of objects, and this process of differentiation and specialization will be retarded by the fact that young children do not at first pay particular attention to differentia, partly because they cannot attend to very many things at one and the same time. The above process of clearing up of percepts, and later of the more general concepts, is typical of the way in which the child mind develops.

A problem of very practical importance for the teacher concerns the contents of children's minds when they enter school. Several investigations have been made in this connexion, with really amazing results as to the possible gaps in children's experience of even the commonest things. So much is this the case with individual children, and so wide is the range of common objects which may be unknown to different children in a class, that G. Stanley Hall, who was one of the pioneers in this type of investigation, maintains that the only safe attitude for a teacher to take up with regard to a class of children who have just entered school is that they are not familiar with even the commonest objects in their surroundings. If a teacher takes up this attitude, until she receives evidence to the contrary, she may be overstepping the mark of caution with many of the children, but she will at least be sure that she is in no case making the much more dangerous assumption that many of them are familiar with something unknown to, or at least unnoticed by, them. To act on this assumption would be to attempt to build without any foundations whatsoever. Again, it must be noted that the mere fact that a child is familiar with the name of an object is no guide to its knowledge of the object itself.

One of the most fruitful means of investigation of the perceptions of children and their attitude towards a more or less complex situation has been the method of "description of pictures." This of course introduces the additional factor of the child's powers of description, but if we bear this in mind we shall see that some quite interesting results have been obtained.

The two chief investigators of this problem have been Binet in France and Stern in Germany. Their method was very simple. They showed a picture to a child and asked him to tell them what he saw there, or what the picture was about. The children's responses were carefully noted, and then classified under various headings. Thus Binet found the following stages of development with age: III, enumeration; VII, description; and XII, interpretation. Thus, for example, one of the pictures used in the Stanford revision shows the interior of a Dutch kitchen, with the mother sitting at the table and looking rather sadly towards her child, who has turned away from her and is crying. At the enumeration stage a child would say that there was a woman and a little girl and a pussy cat and a table and a window, and so on. At the description stage the child might say that there was a woman sitting in a chair, and a cat sleeping on the floor and a child crying, and so on. But it is not until the interpretation stage is reached, about XII, that the child might begin to suggest that the little girl had probably been naughty, and that her mother had had to scold her and thus make her cry and was now looking at her more in sorrow than in anger. In this way we see the gradual increase in synthesis in the child's attitude towards the situation represented in the picture. At first he is only interested in individual details, and then gradually enlarges the size of the group to which he attends, until finally the picture is regarded as a whole. The more one investigates the differences between the child and the adult mind the more one comes to recognize this synthetic power as one of the chief distinguishing features.

In his summary of the results of his experimentation Stern lays more stress on the nature of the objects observed at the successive stages. Thus he finds four stages, viz. the substance stage, until VII; the action stage, at VII–X; the relation stage, at XII–XIV; and later the quality stage, at XIV. In the substance stage the child attends only to individual objects on the picture, as in Binet's enumeration. At the action stage the child is interested in what is being done in the picture and describes parts of it. At the relation stage he begins to connect various items in the whole picture and to mention their spatial and other relationships to one another. Finally, at the quality stage he pays more attention to such qualities as colour, appearance, etc.

If in addition to asking a child to tell you what he sees in a picture you try the experiment of showing a picture to him and warning him that you want him to tell you about it after you have taken it away, and then obtain a spontaneous description, and also ask certain questions about the picture, some additional interesting results emerge. Of course in this case you are also calling into play the child's memory, but if we allow for this we can obtain further information as to the nature of the child's perceptions and as to what he observes. In the first place, as to the amount observed. This increases with age in the following proportions: for each item observed at VII there are 2 at XIV and 3 at XVII, when we measure by the spontaneous narrative. If, on the other hand, we use the answers to a set of questions, we find not quite such a pronounced difference; thus for every item correctly reported at VII, we have only 1½ at XIV and no further improvement at XVII. In connexion with the questions, some of which are deliberately of the leading type, we find that younger children are very much more open to suggestion by the nature of the question. For example, if in the case of a picture in which there are only brown-skinned natives the question, "Is the white man standing on the left or the right of the picture?" is asked, then a much greater number of children are apt to think that he must have been somewhere and will guess. But it is quite worthy of note that not a few adults will also fall into the trap. This is one of the reasons why certain questions are ruled out of order in legal cross-examination, and also why the evidence of children must be very cautiously accepted.

Two very important special forms of perception refer to space and time, since so much of our teaching depends on the proper perception of space and time. With regard to space the main categories are size, direction, distance, form, dimension (two or three), and the representation of tri-dimensional space in two dimensions, as in a picture. Our perception of space is based in the last resort on our movements through space. Thus the young child learns his first lessons with regard to space by his movements of grasping or reaching towards an object, and either touching it and finding that it is near him or not touching it and finding it far away. In the second place, when he is old enough to creep or walk he begins to learn about space by actually moving in it. In this way a gradually increasing and more accurate perception of size is built up. In order to improve the perception of form the elementary geometrical forms must be learned, and here the psychologically simplest form is the circle, or rather the sphere, and not the triangle, as has often been supposed. Here, again, the surest way to attain to accurate perception is not by mere visual presentation but by actual handling, as in the case of the Montessori sandpaper letters or the geometrical insets. The proper appreciation of the two dimensional representation of tri-dimensional space is a very late development, as may be seen by the considerable difficulties which pupils in their teens experience with solid geometry. A very interesting investigation might be made into the knowledge of such facts as below, above, right, left, in front, behind and the like with children of different ages. With regard to left and right the Binet tests show that a knowledge of these terms may be expected from a normal child of six. With regard to the so-called " esthesiometric index " or sensitivity to two simultaneous impressions on the skin, it is found that children are actually more sensitive than adults, i.e. they can recognize two points as such at a much smaller distance apart. Further, with regard to the estimation of distances traversed by movements of the limbs, children are more sensitive in their larger joints, while with adults the reverse is true.

But it is in connexion with the child's perceptions of time that the much more startling results have been obtained, and they play a very important part in the child's learning, especially in connexion with history. What is the use of trying to teach a child about the different centuries when he has no definite idea as to what a year or a month or even a week is ? By means of certain quite simple questions it may be ascertained that an average child's perceptions of time are very vague indeed. Thus young children may only think of day as opposed to night, and not as representing a fixed length of time. Again, by asking a child whether he would like to have something which you know he would like very much this week or next week, he is just as likely to answer next week. Again, it is found that young children are only able to place exactly in time or to date an event in the very recent past. Thus Rusk found that a boy of five could not be got to date back anything beyond three weeks, and at seven and a half not beyond six months, while at eleven and a half he had a proper understanding of dates in history. Another boy of eight could also not go beyond six months. Everything before that happened simply in the past. Rusk[1] also points out the apparent analogy between our perceptions of space and time, since up to a certain distance we are aware of relative depth or duration, but beyond that everything seems to be in one plane, as the stars, or at one time, as the indefinite past. For the child this limit of definiteness is much closer both in space and time, and gradually enlarges with experience. It is an interesting speculation as to whether the modern man's limit of differentiation with regard to space has been increased because of the enormously increased speed and facility of travel, and also by the newly gained power of flight to very high altitudes. The foreshortening which undoubtedly takes place in one's perception of such time intervals as a year is due to the fact that the basic standard, viz., the length of one's own life, is ever on the increase. In connexion with an attempt to devise parallel series of tests to the Stanford revision, in order to avoid the difficulties which might arise through familiarity with the standard series through repeated application, or, on the other hand, the possibility of unauthorized coaching, Terman and his students drew up an interesting series of questions of increasing difficulty in connexion with perceptions of space and time, or at least with the knowledge of the names for these perceptions, and this or a similar list would form a very good basis for a thorough study of the ages at which these various names become familiar.

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[1] Appendix B, 21.

MEANING

Among the many changes produced in a person by experience, and more especially by education, one of the most interesting, and at the same time the most baffling is the acquisition of meaning by large groups of originally meaningless symbols. For adults the meaning of an experience has become so closely bound up with the experience in itself that, unless their attention is specially called to the difference, they are entirely unaware of it. Thus, for example, an adult will say that he hears someone typewriting in the next room, when, as a matter of fact, all that he hears is a succession of clicks, with the occasional tinkle of a bell and a grating sound as the carriage is pushed back to the beginning of the next line. Indeed in this case there is a much larger basis in actual sensation than is often available. Thus on hearing a few disjointed sharp noises in a certain characteristic rhythm he will say that he hears a horse trotting or cantering down the road, and so slight is the actual stimulus required in this case that for stage purposes it can be quite realistically reproduced by very simple mechanical means. Of course, by far the greatest discrepancy between the actual symbols and the meaning conveyed by them is shown in the case of the written or printed word. Here we have a series of small black marks, arranged in lines, which are capable of expressing the most extraordinarily diverse meanings. In this case if an adult were asked to describe what he saw, he would say that he saw a page on which certain information was printed or written, and it would never occur to him to say that he saw a page with rows or lines of black marks.

In order to make this clearer to anyone who has forgotten, as nearly every one has, how it feels to look at a printed page without getting any meaning from it, it is quite an interesting experiment to take up a book written in a foreign language unknown to the reader, and, if ordinary printing is used, then there will result a guess at the sound of the printed matter, with very little chance of any further meaning attached. If, in addition, it is possible to have a look at a book written in entirely different characters, such as Chinese or Arabic, then we have a case where neither the sound nor the meaning of the printed material results from the sight of it.

The problem as to how this meaning comes to be so closely and indeed indissolubly attached to certain symbols is still a long way from solution, but several very valuable indications have already come from a variety of sources, and they all seem to agree in locating the origin of meaning in use.

If a young child of five is asked to tell what he means by certain words, then in almost every case he will give a definition in terms of use. Thus a chair is to sit on, a fork to eat with, and so on. In the original Binet tests, when asked to tell what a mother was, the children usually answered " to take care of you." It is only when the child reaches a mental age of about eight that we expect it to define in terms superior to use, as, for example, to tell to what more general class the particular object belongs, and to give some of its distinguishing characteristics. At this stage we might expect to hear that a chair was a piece of furniture, with four legs and a back, which is used for sitting on, and so on.

In this connexion the author still has quite a definite feeling of repugnance towards words printed in heavy black type, dating from his school readers, in which the new words at the head of the lesson were printed in columns in heavier type. These words the children were expected to define, and the feeling of helplessness still arises involuntarily in the face of words printed thus, where the boy was asked to define in a way that would satisfy the teacher words which he could use perfectly correctly but which he could not fit into the required formula of a logical definition. Ever since he became a lecturer to intending teachers the author has sought to save future schoolboys from a like fate.

The fact that meaning depends on use or reaction or movement is further illustrated in the well-known catch of asking anyone to tell what a spiral staircase is like, and, in the majority of cases, obtaining a response which includes a demonstration with the hand as to the actual shape of such a stair.

Again, the ways in which one and the same experience can have such a variety of meanings to different persons, according to the use to which they would tend to put it or the way in which they would react to it, illustrate the dependence of meaning on reaction. Take as an example a rock at the seaside. To the sailor it would suggest or mean a possibility of danger, and a tendency to give it a wide berth, while to the geologist it might suggest the solution of some problem in the general structure of the country, with a tendency to approach and investigate. Again, to the painter its form and colour might suggest a study for painting; to the prospector the presence of some valuable mineral. To the child on holiday it might have interesting possibilities in the climbing line, while a doctor might not be able to prevent himself from thinking of it as a source of some accident. A fisherman might regard it primarily as a source of bait, while an ornithologist might study it as the home of a certain rare type of seabird. Any imaginative person might try to find out what it resembled, and at the other extreme an engineer who wanted to build a harbour at that point would either consider it as a hindrance to his channel and devise means of removing it by blasting, or he might try to incorporate it into his scheme of building as part of one of his breakwaters. Finally, a psychologist might call up an image of such a rock as a *useful* illustration of a chapter on meaning. In all the cases quoted the actual meaning given to the rock depends on the use to which it is put in connexion with the past, the present, or the future experience of the person to whom it means something.

The best way for a teacher to realize the way in which the meanings of perceptions are built up is to set aside very rigorously for the time being the teaching attitude, and to adopt the attitude of the psychological tester. (This, by the way, is no easy task, as the author has learned by experience with a variety of classes for teachers, and is only another manifestation of the strength of habit.) Then apply to individual children at different stages the various Binet tests, which are concerned with this side of development, and accept the children's answers without any attempt to aid them even by supplementary questions other than the standard ones laid down in Terman's manual. The following tests are suggested in so far as they are near the child's chronological or presumed mental age: the picture tests at III 3, VII 2, and XII 7; definitions at V 4, VIII 5, XII 2; the vocabulary test up to the point where the child fails; the difference tests at VII 5, XIV 3, and Adult

3; similarities at VIII 4 and XII 8, and possibly the fables test.

If children at various stages of development are tested, and especially if the tests are taken up beyond the point at which the child can succeed and particular notice is taken of the exact nature of their failures, and the psychological basis of the failure is sought for, then one cannot fail to obtain a highly illuminating insight into the development of meaning for the child, and also to realize the nature and extent of the difference between the child and adult mind in this respect. In all such tests the failures are of more significance than the successes, whether for the diagnosis of the individual case or for the establishing of a general concept of the nature of the development from the child to the adult.

CHAPTER IV

IMAGINATION

IN perception there is presentation of the stimuli arousing the sensations, but in memory and imagination the original stimuli are absent, and thus they are both cases of ideal re-presentation where previously experienced sensations are recalled as images. In the case of memory there is a definite attempt to recall the total previous experience in its original grouping; in imagination, on the other hand, the constituent images represent the recall of previously experienced sensations, but their grouping is new. In fact it is this attempt to regroup which constitutes the distinguishing feature of imagination. If we consider the ways in which, and the ends for which, this regrouping occurs we shall be able to differentiate the types of imagination and discuss their relative value in the educative process.

Imagination plays a much larger part in many spheres of life than is generally thought to be the case. The following examples may serve to illustrate this. The landscape gardener tries to plan a new garden, the architect to build a new house, the novelist to evolve a new plot, the mathematician to solve a hitherto unsolved problem, the general to plan a campaign, the breeder to produce a new variety, the engineer to build a new bridge, and any one of us to devise means whereby we may make ourselves more efficient, or, as the adage has it, "to use our heads to save our heels." Thus the exercise of imagination is by no means confined to the poet, novelist, artist, musician and inventor, as it might seem. When we come to discuss the thought process itself we shall see that imagination of the creative type is an essential part of the process, without which real thinking is impossible. And indeed the best way in which to train this type of imaginaion is not in isolation but in direct connexion with some "felt need" of the child, or of some practical problem which he himself wishes to solve. But at a time when the child is only capable of working out relatively simple problems, which do not call for a very elaborate exercise of the imagination, his imagination itself is capable of much higher flights, and in this it should be encouraged with a view to its use in later thinking.

Imagination is a mental process whereby we react in a particular way towards the stimuli received from our environment. In the first place, it always involves recall of previous stimuli, but it is more than a mere passive recall, except in the case of day-dreaming. It involves a deliberate attempt to re-arrange or reorganize the given elements into some new whole, either for the purpose of trying to realize this new whole, or oftener still for the purpose of solving some problem which has presented itself to us in the course of our present experience. In fact, in any situation which is strikingly new we can no longer depend on our memory of previous experiences alone to help us out, but we are compelled either to adopt a blind hit-or-miss policy of reacting, or to attempt to recombine or rearrange various elements from our previous experiences in our imagination in order to try and find the correct method of reacting to the given situation. But the widest scope of this imaginative manipulation of our previous experiences lies in the possibility of not being confined to the occurrence of new stimuli but having the further possibility of actually imagining entirely new situations, and then working out the response to such imagined situations, or at least being prepared for such situations when they do occur. This is usually termed foresight.

We may choose as our basis of classification the attitude of the imagining individual. It may be imitative, as in the case of the person appreciating the work of another, whether it be a book, a picture or an elaborate scheme of any kind ; or, on the other hand, it may be creative, as in the case of the writer of a book, the painter of a picture, the builder of a bridge, etc. These last cases also indicate a further classification in terms of the external conditions of their work. Thus in the case of the engineer who is imagining the construction of a bridge or a dam, his putting together of elements of his past experience must satisfy certain external conditions, i.e. his bridge must be strong enough to stand up against all kinds of weather and also to carry certain specified loads. The name "pragmatic" has been suggested for this type of imagination in order to distinguish it from the "æsthetic" type represented by the artist, whose work is controlled in the main by certain internal criteria of his own as to the nature of beauty and the special aim of his own work. Imagination, which is still freer even than this, is sometimes called day-dreaming or fantasy, and it is the confusion between this special type of imagination and the more general types described above which has led to a great deal of the condemnation of the encouragement of imagination in children on the part of a number of modern educationalists, as, for example, Madame Montessori. Even this type of imagination has its uses in spite of the dangers of excessive indulgence of it, but it is indeed a great pity that the other forms of imagination which are essential to all original creative work should come under the same ban as this special type.

With regard to the creative type of imagination, one of the main differences between individuals lies in the relevance of the ideas to the matter in hand, and in the earlier stages especially measures should be adopted to secure a proper critical attitude on the child's part as to the relevance of the suggested ideas. This is best done at first by some form of external control, which shall act at a fairly early stage in the process. Thus, if some practical result can be made to depend on the process of imagination, and, what is of even greater importance, the correctness or incorrectness of this result is obvious to the child himself, then we have a direct and self-acting check on the process. Thus, if a child is seeking to make something for some purpose in a way as yet unknown to him, then if it works he has been successful, and if not he must try again. This pragmatic control is very necessary if a child's imagination is to be of use to him later in real thinking.

Individuals vary enormously in the relevance of the ideas which they are able to recall in the face of some new situation, and even though this is to a large extent already determined by heredity, it may still be influenced somewhat by training. We have the person who can think of a perfectly terrifying number of ideas which may or may not have anything to do with the given situation. Sometimes he luckily hits upon the right idea, but usually he thinks of the right thing too late to be of any practical use. On the other hand, we have the person who is not confused by the number of ideas suggested, but who seems always to manage to hit upon the right one at the first attempt. This is usually due more to the manner of the original presentation and assimilation of the images than to any difference at the time when the images have to be used. In the former case there have been just as many original sensations, but no attempt has been made to organize them as they came in ; while in the second case the original experiences have always been connected in some way with the general stock of ideas already present, and have thus become definitely associated with those images to which they are most relevant. The two people might be compared to the desks of two different persons. On the one everything as it comes in is certainly left on the desk, but is just thrown down anywhere, while on the other each item as it is received is carefully considered and then pigeon-holed or otherwise classified, with the result that when it is wanted it can be readily found. This shows that if training is to do any good with reference to the readiness and relevance of ideas at some future stage, then the point of application of the training should be, not at the point of recall so much as at the point of original impression. One of the surest ways of securing a proper binding in of a new impression to the proper system of old ideas is to have the first experience of it in connexion with something which the child wants to do, and thus give him the chance of *use* at the very beginning. A quite elementary variety of the use of this type of imagination is shown in the case of a set of arithmetical problems in which the use of the four fundamental processes is mixed, and the child has to choose the correct process to be applied. If special exercise is desired in this choice it is possible to ask children merely to say or write which of the four fundamental processes they would use, and not to ask them to do the mere mechanical working out of the problem. It is because a certain amount of imagination is required at this stage of mixed examples that so many children who have managed to solve accurately, by merely following a rule, the foregoing sets of unmixed examples are now hopelessly at a loss in face of the mixed set, and sometimes make the wildest guesses imaginable.

Just as it is possible to devise exercises for the separate training of the senses, so it is possible to work out means of trying to train imagination in isolation; but, as we shall see later, this is a fundamentally wrong principle on which to base our practice. The best way to train the imagination is always in connexion with the general activities of the child, and the only points about which a teacher should be troubled are (1) that the child is having plenty of opportunities to use his imagination, and (2) that some means is gradually introduced whereby in certain cases of creative imagination there will be a check on the relevance of the child's ideas.

Another way in which individual differences in imagery affect the teacher's work is in relation to the so-called "types of imagery," or "ideational types." It has been proved experimentally that each individual has one or two senses by which he *prefers* to recall any previous experiences, and in certain extreme cases there are persons who are entirely unable to have imagery in one sensory sphere, even although they are capable of having the original sensations of that character. Thus some persons are entirely incapable of recalling the *sound* of any previous experience, and also of building up images and ideas composed of recalled sounds, although they are at the same time quite capable of recalling in minute detail the original experience as they *saw* it, and are also capable of building up in their imaginations composite new ideas on a visual basis. A good illustration of this would be the different ways in which various persons recalled the performance of an opera which they had all witnessed at the same time. In the majority of cases there is not such a strikingly complete absence of images of one special type as in the extreme case cited; but there is undoubtedly in nearly all cases one type of image which is more likely to recur than any other, and these differences must naturally affect the meaning of all recalled or imagined experiences, and also the nature of the higher thought processes based on the use of the imagination.

The three main types of imagery which have been noted in this connexion are the visual, the auditory, and the kinæsthetic; that is to say that people tend to recall and imagine things in terms of how they have seen or heard them, or moved in connexion with them. An example of the first type would be the recall of a person's face or the look of a printed page. The sound of a person's voice or the tune of a song would be an example of the second type. The so-called "finger memory" of a piece of music on a piano or the memory of the way to some place in terms of right and left turns, are examples of kinæsthetic imagery. There are also composite or mixed types, such as the auditory-kinæsthetic, where anyone forms an image of something they have read in terms of the sound of the words along with the image of the movements involved in saying the word.

The type of imagery used by anyone may depend to a certain extent on the nature of the material recalled. The most striking differences are usually in connexion with objective and verbal material. And the commonest state of affairs would seem to be that one and the same person uses visual imagery with reference to concrete objects, such as a house or an animal, but prefers auditory-kinæsthetic imagery with reference to words or verbal material. This latter preference may be based both on priority and frequency of association. Thus a child usually knows the sound and say of a word long before it becomes familiar with the sight of it, and in adult life most people probably hear and say a word more often than they see it either printed or written. In fact, so firmly fixed is this auditory-kinæsthetic image of the word, and so essential is it to the grasp of the meaning of the word even in silent reading, that most of us are compelled to read at a much slower rate than we might otherwise adopt if we could grasp the meaning solely in terms of the visual sensation and image afforded by the words read. An interesting suggestion has been made in this connexion that this dependence on the sound and say of the silently read word may be to a large extent due to the excessive importance attached in the earlier stages to reading aloud. It is pointed out that by far the larger proportion of reading in adult life is silent reading, and that more time might profitably be given to this side at school. Means are gradually being devised to test the child's comprehension of what he is reading silently, and, as this would seem to be the main reason for the stress hitherto laid on reading aloud, the experiment of increasing the opportunities for silent reading is at least worth trying, even if it does not tend to do away with the necessity which most of us feel to slow up our rate of reading in order to have the possibly unnecessary aid of the auditory-kinæsthetic imagery. In any case, a means of using silent reading with some control of the results would at least give training in what is, after all, to be the main form of reading in adult life. Again, it must not be forgotten that it is quite possible to read some passages aloud in an apparently sensible fashion without having the least idea what they mean; and thus in many cases this supposed criterion of the understanding of the passage read is illusory.

But whilst most people tend to be of the types indicated above, it by no means follows that all are of these types, and indeed in any fairly large class it is safe to assume that there will be representatives of all the possible types, and as a result the only safe practical course to pursue is to present any new material in as many forms as possible. Thus the children should if possible see it, hear it, say it, handle it, or write it, and in certain cases taste and smell the new stimulus. It is only in this way that the teacher can be sure that the new experience has been presented to each and all of the children in the class in the particular sense in which it is most likely to be retained. There is one condition which must be made to the above statement, and that is that where the children are still so young that the mere process of writing is difficult enough to take up the major part of their attention this additional means of presentation may hinder rather than aid the ultimate recall.

The question as to whether the type of imagery preferred by any individual is due mainly to heredity or to training is rather a difficult one, and as yet there is no decisive evidence on either side; but in either case the fact of such considerable individual differences in the children in a class must be taken into account by the teacher whatever may be the explanation of their occurrence.

Since no one can have an image without having previously had the corresponding sensation, there results a quite natural difference in the proportion of verbal imagery used by a child, and an adult. Since a child experiences as a rule the object before the name of the object, he tends to make considerably less use of verbal imagery than the adult. Some educators have erroneously considered the aim of education to be conforming the child as early as possible to the general adult type to which he will ultimately attain, and have had no thought for the child except as a little man. This error has in some cases been particularly marked in the case of the use of verbal imagery, where they have advocated the speedy change from objective to verbal imagery in the case of the growing child, in order to make him approximate all the sooner to the adult state, and thus, as they think, to accelerate the process of what they consider to be education. But they are entirely overlooking the fact that the word is only useful in the higher thought processes as a compact symbol to represent the object, or group of objects, under discussion, and that it is worse than useless to know a word without having first a clear conception of the objective realities for which it stands. As a matter of fact, most misunderstanding and useless discussion among adults arise from the simple fact that they are using the same words with entirely different meanings. Thus it should be the aim of the educator rather to delay the introduction of a possible verbal symbol for an imperfectly understood concrete fact or object than to hasten unduly the transition to verbal imagery. The emphasis on the "object-lesson," imperfect in many ways as it is, is an illustration of an attempt to carry out in practice this principle of the concrete before the abstract. In the teaching of music there is a similar danger of proceeding too rapidly from the concrete experiences of chords, etc., to the abstract symbolism of the notation.

CHAPTER V

PERCEPTUAL LEARNING

IN a previous chapter on perception an account has been given of the results of a number of experimental investigations which directly or indirectly throw light on the nature of the changes which actually take place in perception in the course of the development from child to adult. That chapter was confined as far as possible to the actual facts observed, and the chief stress was laid on the structural side of perceptions. In this chapter, on the other hand, an attempt will be made to infer from these observed facts the actual process of development of percepts, and at the same time to stress the functional view of perception as the initial stage in the process of reaction.

Before attempting to outline the general process of development we must again call to mind the fact that since most of our conclusions have to be based on the observation of the behaviour of children in the face of various situations, we cannot be said to observe the process of perception itself, but merely to infer the nature of the process from certain external indications in the different reactions, verbal or otherwise, made to one and the same situation at the different stages of development. With this caution in mind, the following inferences may be drawn with a reasonable degree of confidence.

If we assume that the initial stage is represented by

James's " big, booming, buzzing confusion," then the first step in advance from this stage is one of *selection.* By means of passive attention, as already described, certain features in the total experience tend to be clearer and more vivid in the child's consciousness, and these few features stand for or represent the total situation to the child, and thus determine his first perceptions of situations in the world around him. The evidence for this stage lies in the use of one name for a large number of experiences which to the adult are quite obviously different. Were these percepts to constitute an end in themselves there might be no need for a further refinement, but since they are in most cases followed by some form of reaction, the child will soon learn that it is not safe to react always in the same way to what he perceives at this stage as *identical* situations. Sooner or later he is bound to discover that an apparently safe reaction instead of leading to the expected pleasant results, may, on the contrary, lead to results of quite a painful or disappointing type. When this occurs, there arises at once the incentive to find out why this is so, and the only way in which this is possible is by paying attention to hitherto unnoticed minor points of difference in an otherwise apparently similar pair or group of situations. Hence the child is led on to the second stage of perceptual development, viz. the stage of *differentiation.* The child's tendency to define in terms of " use " is another indication of the importance of the reaction at this stage. The correct inference as to the next stage in development is not quite so clear, but the following hypothesis is at least a plausible one. As soon as the child begins to attend to minor differences instead of treating all situations with one common outstanding feature as identical, then the possible number of different percepts is immediately enormously increased. If no means of grouping these percepts were adopted the child might very soon reach a point where it could no longer handle any new percepts and at the same time retain sufficient of its previous experience to profit by it in meeting new situations. Thus there seems to be a need at this stage for some means of grouping the very large number of percepts which are now forming the basis of the child's experience. The simplest means of classifying or grouping a number of different percepts is to notice *similarities* between pairs of experiences which are sufficiently distinct to be experienced as individually independent but which, nevertheless, have enough in common to come under one group or class. The noting of similarities thus forms the next stage in the development of the percept, and it leads quite naturally to the stage of actual *classification.* The perceptual attitude has thus changed from an answer to the question, " What is this ? " to an answer to the question, " What kind of thing is this ? " or " To what class does this belong ? " As long as the child is concerned with the individual experience, even as belonging to a class, his attitude is perceptual ; but, of course, as soon as he begins to consider the classes which are thus formed he is proceeding to form concepts. This stage will be dealt with later. The only further development of the percept itself seems to consist in an increasing refinement in the classes used. When this stage of classification is reached there will naturally be a tendency to interpret any new individual experience in terms of some old or familiar class of experiences. This has sometimes been given the name of apperception, and the group of old experiences has also been called the apperceptive mass. For certain purposes it may be convenient to give it a special name, but in any case it only represents the final stage in the natural development of the perceptual process itself.

It is interesting to note that even among the perceptions of adults we still find examples corresponding to the first stage of identity in the developing child's mind. Thus to the shepherd each sheep in the flock has its own individual characteristics, by means of which he can distinguish it from all the other sheep, but to the majority of adults all the sheep are so alike that he is apt to refer to them as "just sheep." In the same way to the average European all Chinese are so alike as to be practically indistinguishable under ordinary circumstances. Of course in either of these cases, or in any similar circumstances, a very little experience with different examples would soon enable the adult to find grounds for distinguishing the various individuals, who are actually as different from one another as the persons in one's immediate environment. Even in the case of individuals of a familiar type it not infrequently happens that one fails to distinguish between two brothers who, although they bear a strong family resemblance to one another, are still sufficiently unlike to make it easy to distinguish them with a little care. In any case of this kind it is usually the very embarrassing consequences of the mistaken reaction which leads one to exercise greater care in discriminating between the two individuals in the future.

In discussing the differences between attention in children and adults the influence of grouping was noted, i.e. the span of attention for the adult was greater not only in terms of the number of units but also in terms of the size of the units, as a result of greater power of grouping or synthesis on the part of the adult. In the development of percepts we see the same increasing power of synthesis. Thus at the earliest stages the child perceives isolated features only, and there is no need for synthesis, e.g. the enumeration stage in picture reports; but even at the next stage of differentiation it is necessary to group the two things, or experiences, which are being differentiated; and when we come to the still higher stage of classification, more and more individual experiences require to be grouped. This increase in synthesis is also seen in the later stages in picture report, viz. description and interpretation. In fact, one of the most characteristic differences between the child and adult mind in most respects is in the degree of synthesis or integration involved.

One consequence of the various aspects attended to at the successive stages of perceptual learning is that after a time the qualities of the experiences come to be perceived independently from the experiences themselves. For example, such features as colour, size, form, and number are considered independently of the specific objects possessing these characteristics. Stern, in his analysis of the successive stages in picture report, distinguishes a specific quality stage and places it quite late in the child's development.

The use of number apart from the actual objects numbered is a very good example of the stage of abstraction which succeeds the earlier stages of perception of the concrete. The fact that it takes some time to develop is shown very clearly by the two following illustrations. Goddard quotes the case of the feeble-minded boy who was quite unable to divide twenty by five, but who could tell almost at once how many trips he would have to make with a coal cart, carrying five bags, in order to move twenty bags from one place to another, since his daily task was the driving of a coal cart. In connexion with an experiment in the Moray House laboratory, in order to investigate the capacity of young children to name similarities between concrete pictures, instead of between specific objects mentioned by name only, as in the Binet test for mental age VIII, one of the pairs of concrete pictures was chosen with number as the basis of similarity. Thus one picture contained three red triangles and the other one contained three black squares, and we expected that any child who reported the likeness between the two pictures would refer in some way or other to the number of objects in both. As a matter of fact this proved to be one of the hardest pairs for the children tested. In the other cases the similarity rested on some feature of colour or form. In some cases the children simply gave up, and said that the two pictures were not at all alike; but in several cases the fact that the individual component figures (e.g. triangles in the one case and squares in the other) in each picture were all of one kind was given as the basis of similarity in the two situations where an adult would almost invariably have chosen the number. The children tested were all familiar with the number three, but in a situation where their attention was not specifically drawn to the number element they did not spontaneously refer to it, and even went out of their way to find some other basis of similarity. These children were of ages in the range of five to seven years.

Since observation may be considered as a particular type of perception where there is a specific end in view of noting certain features in the situation, with the aim of retaining as much of them as possible, either for the retention's sake or for some further purpose, the possibilities in training observation should be dealt with at this point.

A number of experiments have been made in this connexion. Three different ways were tried of improving the performance of children in a picture observation test.[5] In the first place, after the first experiment was finished the children were shown the picture again, and their errors and omissions were pointed out. The test was then repeated with another picture. Let us call this the " correction " method. In the second place, after the first experiment the children were shown the various things which they might have mentioned, and in addition practice was given in naming colours, sizes, positions, and the other factors which might be expected to come into the description of a picture, and the test was then tried with another picture. Let us call this the " naming " method. The third method was one where an attempt was made to interest the children in the amount and accuracy of the items in their own description, between the first and second tests. This might be called the " score-interest " method. The results were rather unexpected since the method which showed by far the most improvement was the " score-interest " method. This is another example of what proves one of the greatest difficulties in the way of the teacher, viz. the great gap that so often exists between knowing what one should do and the actual doing of it. In this case the mere knowledge of what one ought to mention was insufficient where there was no incentive to improve; while in the case where an incentive was found, even *in the absence* of further specific training an improvement resulted.

Along with the development of the percept itself goes the development of its meaning. But since the first carrier of meaning is use, this particular element seems to play a part in all the later forms of meaning, and indeed the meaning might be considered as the feeling by the experiencing individual of the relationship between his personal attitude towards perception of the situation and his actual or potential reaction to the situation. Thus, whether or not he actually reacts to the situation beyond the perceptual stage, his attitude usually involves an element of awareness as to his most probable reaction, and this may be all that meaning is. Since it involves both the percept and the reaction its complexity will vary with that of both. Thus when the percept has developed from the primitive use stage up to the higher classification stage, the meaning will become similarly enriched, and may not only be concerned with the relatively simple relation between an isolated percept and a possible consequent reaction but will have to handle the much more complicated relations between the class or group of experiences and a number of possible more general lines of reaction to this class. This twofold aspect of meaning makes it one of the most elusive topics of study, since when studying it from the one side we must constantly keep in mind the possible interference of the other. Thus from the perceptual side there is always the possible reference to the reaction, and vice versa. But the mere fact that it represents a relation between the two aspects shows that any attempts to teach meaning without allowing reaction, or at least the thought of reaction, are bound to fail. It is further obvious that meaning is peculiarly personal, since it involves the relation between two stages in one and the same experiencing individual.

ÆSTHETIC APPRECIATION

One side of an all-round training which has been rather neglected in the past is the appreciation of the beauty in pictures, sculpture, and music. But just at the present there seems to be a revival in interest in these subjects, though not always along the best lines. Just as meaning depends on reaction, so the truest form of appreciation of art is based in the individual's own attempts to create the beautiful. Meumann, in his " Æsthetik," distinguishes four types of persons with regard to art. There is first the absolute novice who has never attempted to be an executant, then comes the beginner on the creative side, third is the dilettante with a considerable degree of skill, and finally there is the professional expert. Meumann holds that the dilettante is in the best position really to appreciate a work of art, since he is fully aware of the difficulties which the artist had to overcome but is not so apt as the professional to be so thoroughly immersed in the technique as to make it impossible to appreciate the work of art apart from the technique. If this theory correctly represents the facts, then the best way to develop appreciation for art or music is not merely to give talks on appreciation but to let the pupils try their own hands at the task and then show them the work of the master. An experiment on these lines was tried in some Hamburg schools in connexion with drawing. The children were asked to try and draw a picture of an angry man, and were then shown one or two famous drawings of angry men, and it was found that their appreciation of the masterly way in which the problem had been met was very much keener after their own attempts, however ludicrous some of the latter may have been.

In this connexion another interesting investigation was made. One day the pictures in the class-room, which had been there all term, were removed, and the girls, aged between thirteen and fourteen, were asked to tell what the pictures were about. Only a very small fraction of the class had the slightest idea as to what the subjects depicted were. Such a state of affairs is by no means an isolated one. If this is the case, we must not rest satisfied with the supposedly good effects on children's tastes from the hanging of good pictures in their class-rooms. In order to overcome this indifference and to call into play the influence of novelty in attracting attention, some schools have adopted the plan, both with regard to pictures and museum exhibits, of having fewer objects on view at a time and changing these at least once a fortnight. When this is done it is found that the children are always on the look-out to see what is to be shown next, and as a result there is really some possibility for the pictures to exert an influence on the pupils' tastes.

With regard to music, Sir Henry Hadow, in his Presidential Address to the Education Section of the British Association 1921, pointed out one great disadvantage under which it laboured at the present time, viz. the fact that so few people were able to sit down and read silently from a score in the same way that they could sit down and read a play of Shakespeare as often as they liked. In this way the best music suffered from the few occasions on which it could be heard and appreciated. It was just as bad as if the only way that one could appreciate a play was in the actual hearing of it when performed.

The use of the gramophone, although it cannot entirely replace this silent reading of music, can at least enormously increase the opportunities for hearing the performance of music by the world's best exponents.

CHAPTER VI

MEMORY

WHENEVER the chief end of education is considered to be the imparting and absorption of information, then memory and its psychology is of primary importance; but when we aim at cultivating the power of independent and intelligent thinking in our pupils, memory, although still important, becomes a secondary factor. But even when it was considered of primary importance so little was known of its psychology, or at least so little was applied, that in a population mainly brought up to know rather than to think certain widely advertised methods of memory training seemed to find a ready market. Discussion with many students before they have studied the psychology of memory has again and again shown an amazing ignorance of some of the most elementary principles involved.

Since memory must still play a part in helping to store up the results of previous experience for future application, an attempt will be made in this chapter to give a few of the clearly established facts about memory which should serve as a guide for practical attempts to instil efficient habits of memorizing. No attempt will be made to give a general discussion of the psychology of memory, for which reference may best be made to some textbook on pure psychology.

In memory there are three distinct stages, the original impression or impressions, the intermediate retention, and the ultimate recall or attempt to recall. We can deal directly with the first and third stages, but we can only make deductions about the intermediate stage from the nature of the third. Thus the teacher can influence the first impressions by the manner and means adopted for the first presentation of the material, and can also assist the recall by pointing out certain rules deduced from the laws of association.

In the first place, there are undoubtedly individual differences in memory, or rather memories, which depend on innate capacity or heredity, but at the same time the use of any given memory can undoubtedly be improved by a correct understanding of the laws of association of ideas. In the preceding sentence memories have been deliberately referred to, since exact investigation has shown that memory may vary greatly in the individual for different kinds of material even of a very closely allied nature, and the training of memory with one kind of material does not necessarily involve a corresponding degree of improvement with any other type. As an example of this may be quoted the case of the man who was able to reproduce after one hearing as many as fifty-two digits while he was at the same time only able to reproduce about seven or eight letters which the average person can recall when presented in the same way.

If we deal with composite ideas, then we require to postulate four Laws of Association, but if, on the other hand, we deal with the elementary images involved, we can reduce the four laws to one Law of Association for images.

The four Laws of Association for Ideas are the Laws of Contiguity in Space, Contiguity in Time, Similarity, and Contrast.

The Law of Contiguity in Space states that if any two ideas A and B have been contiguous or next one another in space in some previous field of consciousness, then B will tend to be recalled whenever A is recalled.

The Law of Contiguity in Time states that if any two ideas A and B have occurred simultaneously or in immediate succession in some previous field, then B will tend to be recalled whenever A is recalled.

The Law of Similarity states that if two ideas are similar, the recall of one tends to bring about the recall of the other.

The Law of Contrast states that if two ideas contrast with one another, the recall of one tends to bring about the recall of the other.

If we remember that similar ideas must always have some constituent images in common, and further, that we never contrast two ideas unless they have a certain quite appreciable proportion of their constituent images in common, it is easy to see that these four laws may all be deduced as special cases of the following single law.

The Law of the Association of Images states that whenever two images X and Y have been present together in some previous field of consciousness, then the recurrence of one of these images will tend to bring about the recall of the other.

We might compare the first way of considering the train of thought to a series of slides on a magic-lantern, where successive pictures, like successive ideas, although connected by some common subject-matter, are nevertheless produced by a process of complete displacement.

When, on the other hand, we consider *images*, the succession of ideas might rather be compared to the succession of the pictures in a cinematograph, where the difference between two successive pictures is very slight and is produced by the gradual replacement of individual elements while the main body of the picture remains constant. This would correspond to the gradual fading out of certain images and their replacement by others. Incidentally it is interesting to note that a succession of cinema pictures is very much more "alive" than any series of lantern slides ever could be.

Now, it usually happens that any image A which is present in consciousness will have occurred in past fields of consciousness with a large number of other images B, C, D, E, etc., and there must thus be some further means of selection whereby some of these images are more liable to recur than others. The main principles are contained in the secondary laws of association, viz. those of frequency, recency, priority, and vividness of the previous impression.

The Law of Frequency states that if A has been oftener with B than with C, then, other things being equal, the recall of A is more likely to bring about the recall of B than of C.

The Law of Recency states that if A has been more recently with B than C, then, other things being equal, the recall of A is more likely to bring about the recall of B than of C.

The Law of Priority states that the images which were associated with A at its first appearance are, other things being equal, more likely to be recalled with A than images which were associated later.

The Law of Vividness states that if the original impression in which A and B occurred together was more vivid than that in which A and C were paired, then, other things being equal, B is more likely to be recalled with A than C is.

In all these secondary laws the clause, "other things being equal " is of vital importance, since it will at once be obvious than in many cases the operation of these laws will be in direct opposition to one another, and the ultimate actual recall will depend on the relative strength of the bonds which have been formed between the various competing images.

Of the four secondary laws of association the three laws of frequency, recency, and priority are more or less mechanical in their action. We can to a very large extent control by quite simple means the frequency, recency, or priority of any given association, but it is quite a different matter in the case of vividness. The whole mental background and experience of the individual go to determine what shall be vivid to him or her, and in this way the vividness of any experience is not a matter to be mechanically controlled at the time of the experience itself. In order to be vivid an association must in the first place occur in the focus of attention, but by no means all ideas which come into the focus of attention are of the same degree of vividness. Among the other factors which determine the relative vividness of ideas and their associations within the field of attention are the general emotional state of the individual, the depth of the interest to which the ideas appeal, and possibly the striking way in which the new idea does or does not corroborate the already formed system of ideas. Thus, although no specific rule can be laid down with regard to making any special case of association as it occurs in the child's experience particularly vivid, still we can deduce a general rule that any instruction which rouses the child's enthusiasm or appeals to what are known to be deeply-seated interests will at least have a greater chance of being vivid, and consequently of being retained in a really available form. A rule for the student in this connexion is that it is better to work hard and keenly while you are working, and then to play just as keenly in between, rather than to dawdle over your work, when it will almost inevitably lose all vividness.

From the above general laws may be deduced several rules for practical application, especially with regard to the original presentation and study of any material whose retention as a connected whole is desired. The following are a few examples:

Be very careful with the very first presentation.

Try to make the presentation as vivid as possible, by making sure that the images to be associated are not only in the field of consciousness, but are also in the smaller and clearer field of attention; or, in other words, always study hard and attentively while you are at it.

If you know beforehand that you will be required to reproduce certain images together, then study them together at the last possible moment. This rule is more one of expediency than otherwise, and is illustrated in cramming, but also in the last glance over his notes which a good speaker will make before speaking without reference to them.

If you desire that a certain image A will be most likely to recall another particular image B, then take care that A and B occur together oftener than any other pair, such as A and C, or the like.

We may make use of the primary law of similarity in another way. If we desire to recall as many elements in a complex situation as possible after a certain amount of study, then we should deliberately seek to associate them into groups on the basis of this law. As an example, the common game of trying to remember as many objects as possible after a short exposure together on a tray may be used. If one and the same person tries first to remember these simply by looking over them again and again during the time of exposure, and then on a second occasion, with the same number of other objects, deliberately tries to group them by similarity, the difference in the number of objects correctly remembered will be quite astounding. Thus, for example, the objects might be remembered as follows : shilling, sixpence, penny, pencil, pen, ink, blotter, page, picture, brush, comb, and so on. Although this may seem trivial in the case quoted, it may, nevertheless, be used with considerable success in much more serious matters.

There are several other factors which condition the nature of recall. Thus, with reference to the distribution of the repetitions of the original impressions, it has been found by experiment that it is better not to take all the required repetitions of any given piece of material at one sitting, but rather to spread them out over a number of sittings with a considerable interval between. Thus, if you know that you have time to go over some material twelve times, it is better to take the successive repetitions in small groups of three or four at a time rather than to sit down and go through all twelve repetitions at once. A psychological process which is as yet but partially understood, and is sometimes called " mental incubation," seems to be at the basis of the efficiency of these intervals in learning or memorizing. The process itself cannot be definitely proved to be present, but there are a number of otherwise unrelated phenomena which could only be rationally explained on the basis of some such hypothesis as mental incubation. This term is used to indicate the fact that some time seems to be necessary for any new idea to become an integral part of the individual's system of ideas. Further, during the period of incubation in which the new idea has as yet not become definitely set, it cannot and does not act towards other ideas, old or new, in the same way as it does after the process of incubation is complete. Amongst the phenomena which have led to the formulation of this supposition are the following. In the first place, we have the well-established cases of amnesia, or loss of memory, after some severe shock, and the peculiar way in which the memory gradually returns. Thus, for example, in a case where an electrician, in the course of his work, has received a very heavy shock which did not kill him, but rendered him unconscious for some time, it usually happens that when he recovers consciousness his memory of the past before the accident is partially a blank. This blank refers to some period, such as a week immediately before the accident, while at the same time he is quite capable of a normal memory for all the events of his life prior to that week. Then in connexion with the gradual recovery of his memory a still more curious phenomenon results. As time goes on he is able bit by bit to remember more and more of the events of that week, but this recovery takes place from the beginning of the week and not from the more recent events at the end ; and in some cases almost complete recovery of memory may occur, but very seldom are the events immediately preceding the accident ever remembered. The explanation offered for this is that the ideas or experiences immediately preceding the accident had not had enough time to become sufficiently set or fixed in the mental system of the man to be able to withstand the severe shock of the electric current. The above might be called a negative case, involving the lack of opportunity for incubation to occur, but positive evidence is also available. Thus the state of affairs which is discussed elsewhere, which led James to state that we may be said "to learn to skate in summer and to swim in winter," would seem to support the hypothesis of incubation. In the same way the effect of intervals in memorizing also provides positive evidence.

Contrary to the British custom of studying the various branches of such a subject as mathematics more or less simultaneously, the practice of taking them in succession and concentrating on one branch at a time is practically universal in the United States. Thus in any year of the High School course fewer subjects are studied, with the result that successive lessons in any one subject follow one another with a much shorter interval between. Thus if algebra is one of the subjects studied, then there will usually be at least one lesson every day in algebra, with the result that this entirely new way of looking at arithmetical processes in a generalized form does not have such a chance of becoming definitely established in the minds of the pupils at the beginning as might be the case if the interval between successive lessons were somewhat longer, as it must necessarily be in such a system as the British. Of course there is undoubtedly the counterbalancing feature of the greater likelihood of overburdening in a system where several branches of a subject are taken simultaneously.

Again, with regard to the breaking up of any material to be learned, experimentally controlled learning has shown that, contrary to almost universal practice, the "whole method" is better than the "part method." The latter is the usual way of learning poetry, for example, a stanza at a time, while the former means that every time the learner goes right through the poem or other material from beginning to end. It has been found that the whole method requires fewer repetitions to attain accurate reproduction, and also takes less time. It also leads to greater security in retention and accuracy in ultimate recall. The main reason for the breakdown of recall in the case of the part method lies in the fact that, owing to repetition or frequency, the bond between the end of the last line of any stanza and the beginning of the first line of the *same* stanza has become stronger than the desired bond with the first line of the *next* stanza. The explanation of the actual preference of most people for the part method lies in the discouragement due to the *apparent* lack of progress in the first few repetitions by the whole method. After all, every one likes to see more or less immediate results from any expenditure of effort. Naturally there are limits to the extent of what may be taken as a "whole," and this is more especially the case with children with whom the two factors of fatigue and discouragement are more likely to interfere.

Another point which plays an important part, especially in class teaching, is the difference between the preferred type of imagery in different individuals. Thus some people can remember better in terms of visual imagery, or of what they have seen, while others again may prefer auditory or kinæsthetic imagery, or remembering in terms of what they have heard or said or done. The only way in which a class teacher can make sure that all the members of her class have had the material presented in the way which suits them best is to present it in as many ways as possible, i.e. to the eye, the ear, the touch, the handling, and the saying if possible. One exception to the practical application of this rule is that in the case of younger children any means of presentation which is inherently difficult for them does not aid in retention, e.g. writing something to be remembered hinders rather than helps young children, because their attention is too much taken up with the mere mechanics of the writing.

An attempt to improve the amount and accuracy of recall may be made by pointing out ways in which ideas or images presented at the same time or place, or immediately after one another, may be further linked by means of elements of similarity or contrast. But in this connexion it must always be borne in mind that children do not necessarily, as adults do, connect two or more objects or ideas, which are presented at the same time, on the basis of similarity or contrast or any other category of classification. This is indicated by several of the Binet tests. Thus a child does not give the differences between two objects as a rule until he is seven, and likenesses until he is eight mentally. Also the various stages of enumeration, description, and interpretation of a picture show that the tendency towards grouping or synthesis of complex material only develops very gradually, even at a time when a child may be paying attention to extraordinarily fine details in the matter presented. But if an attempt is made within the capacity of the child to encourage any such grouping, improvement in memorizing should be expected.

Thus we see that the best form of memory training does not depend so much on merely exercising the memory by the actual quantity of material memorized, but rather in making the child gradually aware of the most efficient methods of applying the fundamental laws of association, without, of course, going into any elaborate discussion of these laws themselves. The use of mere quantity of material, whether interesting or otherwise, in the hope that we are in some way improving or training the memory in general, is further discredited by the results of experimental work on the transfer of training, which shows that, apart from improvement due to applying the general principles of association, there is very little noticeable improvement in the memory for one type of material from drill in memorizing another type.

With regard to the reproduction of verbal material, there are two kinds of memory, viz. rote memory and logical memory. In the former the exact sequence of the material is reproduced without taking into account the sense of the passage, while in the latter the sense is reproduced rather than the exact words. At one time it was supposed that there was a certain stage in the child's mental development when his rote memory reached a maximum, and that after that time his power of rote learning diminished. And this was used as an argument in favour of introducing certain studies which called for the exercise of this form of memory at this stage. But more exact experimental work has proved that this view is incorrect. An adult can learn much better by rote than any child, if he sets himself to do so and does not try to make use of logical memory, as he is in the habit of doing. The immediate memory tests of series of digits at the different mental age levels in the Binet tests are an illustration of this. Thus we have the following :

Mental Age.	Digits Repeated.
III	3
IV	4
VII	5
X	6
XIV	7
Sup. Ad.	8

Of course there is this difference between the child and the adult, that the child tends, if left to himself, to learn by rote, and the adult to learn by the sense of the material. One way of finding out whether anyone is learning by rote or not is to note the nature of the errors made. If they are of a senseless nature then the person is probably learning by rote. Until a child begins to remember by the sense, the total amount that he can retain is naturally considerably restricted.

As has been mentioned in connexion with the span of attention, it is important to remember that as soon as one oversteps the limit beyond which accurate retention after one presentation is possible, the result is that the child, or adult, no longer remembers even as much as he did before but is at once confused, and in some cases can remember nothing at all. Thus, if a child is at the stage where he can reproduce accurately up to five digits after one presentation, then it is quite likely that if he attempts to reproduce six digits he will not only fail to do so but he will also be unable to recall even five of the six digits presented. Because of this, teachers must always be careful not to overstep the possible limit for the children under their care with regard to what they are expected to remember after one hearing.

One factor which seems at first sight to cut across the uniform application of the laws of association, and particularly the secondary law of frequency, is the way in which the intent to memorize influences the speed of committing a given piece of material to memory. Thus, for example, the author has several times had the experience of reading the accompaniment to a song for a friend without any intent to memorize it, but just to read it well enough each time. After a number of repetitions, far in excess of those which would have been necessary for complete memorization if the intent to memorize had been present, attempts to play the accompaniment from memory have proved quite in vain. This and similar experiences seem to show that the mere mechanical application of the law of frequency is not in itself sufficient, although, of course, in the long run, even in the case cited above, memorization would have resulted, since with recurrent attempts to read the degree of familiarity noticeably increased. Again, this intent to memorize may affect one's learning in two different ways, since it is possible to learn with the intention of securing immediate reproduction, or, on the other hand, for delayed reproduction. In the former case it is quite possible to become letter perfect in something for some specific occasion, such as an examination, and then apparently completely to forget what had been learned. This completeness of forgetting is only apparent, and although it may lead to an absolute impossibility of recall, still an attempt to relearn the material would show, by the smaller number of repetitions required, that the forgetting was not by any means so complete as was thought.

The psychological explanation of the effect of the intent to memorize on the actual results probably lies in the secondary law of vividness of the original presentation, and more especially of the original associations. In the case of the accompanist who is merely reading with a view to the present performance of the song, the individual items, such as chords or even phrases must be to some extent in the field of his attention, and hence somewhat vivid; but, on the other hand, some of his attention is undoubtedly taken up with the effort to follow the singer, or really to accompany him. In the other case, where the pianist deliberately sits down to memorize the piece, not only the isolated chords and phrases as they occur are in the field of his attention, but he is also attending more carefully and purposefully to the sequence of the chords and phrases, or, in psychological terms, the associations involved in the sequence are in the field of attention as well as the individual elements, and are thus much more vivid than in the other case, with the result that fewer repetitions serve to stamp in these associations definitely. Of course this may be only part of the explanation, since there may be something also in the set or disposition of the mind towards the particular experience as it occurs. The presence of such a set or disposition is obvious in many other ways, and helps in many cases the speed of assimilation. Thus, when we are reading, the beginning of any sentence or phrase produces a certain set or state of expectation as to what is to follow, with the result that in a great number of cases we know what words are going to follow, and we have thus in a way read them before we come to them. So strong, indeed, is this tendency that we often read not what is actually on the page, but what we expect to see there. In this way we can explain the fact that unless one is deliberately looking for them one can so easily pass over misprints, by reading what one expected to be there rather than the wrong word which occurred as a result of the misprint. In the same way there may be, in addition to the increased vividness of the original associations, some form of memorizing set or disposition of the mind which facilitates retention. From the teacher's point of view, whatever the explanation may be, there remains the positively established fact that the intent to memorize quite appreciably affects the success of a given number of repetitions of the matter to be memorized.

SECTION III

CHAPTER I

REACTION

HAVING dealt so far with perceptual learning, we must now consider the process whereby motor learning can take place. Following the same general plan, we shall, first of all, consider some of the ways in which our reactions are actually modified, and then proceed to discuss how this modification takes place. Thus, in successive chapters we shall discuss reactions and their modifications, the laws of learning, and the results of the learning process.

By a person's reaction to any situation we mean simply what he does, or in some cases what he does not do, as a result of messages received through his sense organs and sensory nerves.

At the lowest level we have the reflex reaction, where there is no choice, but where a certain stimulus inevitably calls forth a certain reaction. An example of this is the case of the change in size of the pupil of our eye in accordance with the brightness of the light to which it is exposed. The pupil of our eye expands in a dim light and contracts in a bright light, and we have no control over this reaction, except that it can be for a time put out of action by the use of certain drugs. Anyone can observe it, by means of a simple experiment, with the aid of a mirror and some form of light which can be turned on or off suddenly. To do this, stand before the mirror in the dark for about a minute, and then suddenly turn on the light and watch the reflection of your eye in the mirror. If the light is not too intense so as to blind you, you can see the pupil of your eye contracting. The reason why one is blinded either in passing from the dark to the light, or vice versa, is that this process of adaptation of size takes an appreciable time, and until it is finished the eye is either getting too little or too much light. The wink of our eyelid on the sudden approach of anything to our eye, the cough or sneeze when anything tickles our throat, and so on, are also examples of reflex reactions. Were all our reactions of this nature then education would be impossible; but even in a highly modifiable nervous system, such as ours, we have to take account of such reflexes as a negative factor in education, since they represent a sphere within which attempts to modify by education are practically futile. These reactions are mostly of the nature of necessary safeguards to vital portions of our body, and are necessary preliminary conditions to our survival in order that we may have time to learn.

Besides these innately determined specific types of reaction we also have the instinctive *tendencies* to reaction, which we have discussed under instinct, where the specific reaction to a given situation may not be actually fixed but the general nature of the reaction may be. The educator must also take these into account, but from his point of view by far the most important type of reaction is the acquired type, which is subject to an almost unlimited amount of modification in the light of experience.

There are several varieties of such modifiable reactions which require different treatment to arrive at satisfactory results. In the first place, there is what may be called the simple reaction, which involves practically only one muscle or very closely grouped set of muscles. Such, for example, are simple movements of one portion of the body, such as an arm or a finger, e.g. an outward sweep of one arm. From this simple stage we may pass through all degrees of complexity up to elaborate movements which call into play almost all the muscles of the body in a certain succession, and with a certain relative stress or emphasis, e.g. the movements involved in swimming.

For the simpler type of reaction all that is involved in learning is the choice of the proper individual movement and the discovery of the speed and force with which it is necessary to employ it, and possibly in some cases the exact extent of the movement required. But with the more complicated forms of reaction there are a number of other points which require to be learnt. Thus we have in the first place the choice of the proper elementary simple movements which go to make up the complex reaction. We then have the two aspects of timing and proportion of force with which to use these various elements To this latter process the name of co-ordination has been given. In the earlier stages of learning considerable attention has to be devoted to this process, although at the final stage, when we have learned the complex reaction, we may be entirely unconscious of the individual elementary movements involved and also of their proper co-ordination, as, for example, in some of our habitual reactions, such as walking and writing. Since co-ordination has this twofold aspect of timing and relative force, there are two ways in which a person may be making mistakes, and it is sometimes very difficult to find out in which of the two respects the actual attempt is wrong. The learner might quite rightly say, " But I am doing everything that you told me to do, and yet I cannot get the desired results," and all that might be wrong was the timing. Anyone who has tried to learn to play golf is only too familiar with this timing aspect of the successful swing.

The initial stages of any form of learning of a complex reaction are usually accompanied by an extraordinary number of entirely unnecessary, superfluous movements which hinder rather than help the final achievement. Thus beginners in writing or in cycling indulge in a large number of unnecessary movements, such as sticking their tongue in their cheek, wrinkling their brows, and going through all sorts of contortions in the effort to select and isolate the required movements.

For the young child more than for the adult there are really two successive stages in learning a complex reaction. In the first place, he usually has to learn the simpler processes which go to make the final complex reaction, and then he has to learn the way of fitting them together. The adult, on the other hand, usually has had some experience with the simpler processes involved in any kind of new complex reaction which he may want to learn, and will only have to master the way in which they should be put together. Of course he is subject to the possible disadvantage that as a result of his previous experience these elementary reactions have become so firmly connected with certain other reactions that he will have great difficulty in unlearning this acquired association of movements.

This distinction indicates a different method of teaching young children and adults. With adults it would be safe to proceed at once to the attempt to link up the various elementary movements involved, while in the case of the child it would probably be better to analyse and break up the complex reaction into somewhat simpler elements, from the point of view of the movements involved. This breaking up should, however, refer to the process and not to the product. The best illustration of this is given by two different ways of attempting to analyse and simplify writing. In the one case a study was made of the *product,* viz. the letters to be produced, and it was found that they all consisted of certain combinations of straight and curved lines, and thus it was considered best to begin by teaching the child to write the elementary lines and curves involved, hence the system of "pothooks" of the copy-books. As an example of the analysis of the *process,* the method advocated by Madame Montessori may be quoted. In this case the complex movement was analysed into the holding of the pen or pencil, and the following of the shapes of the letters. The scribbling exercises, where the child sought to fill in various outlines by scribbling with a pencil, gave practice in holding the pencil, with only a minimum of restriction of the movements involved by the limits of the figure to be filled. On the other hand, the child learnt the minor co-ordinations of movement necessary for shaping the letters by following the shapes on the large sandpaper letters with the finger-tip, without being at the same time troubled with the new co-ordination involved in the proper holding of the pencil. After such a preliminary training the child itself suddenly one day combines the two minor co-ordinations at a time when it has mastered them singly and writes of itself.

The contrast described above might be considered as the difference between a logical and a psychological analysis of the writing process. The results obtained are most decidedly in favour of the psychological basis of analysis.

In connexion with this individual method of learning the shape of letters and numbers by tracing them on sandpaper models while they lie on the table or the floor in front of the child, one or two Montessori teachers have mentioned a difficulty which seems to occur rather frequently, and that is that the children very often tend to write the letters or numbers upside down at first. The psychological basis for this tendency would seem to rest on at least two practical possibilities: (1) The child himself might place the numbers before him upside down unless some means were devised for indicating to him, beyond all possibility of doubt, which was the bottom of the card on which the letter was pasted; and (2) the child might obtain his first experience of the letters by watching another child manipulate them, in which case he would be just as likely to see them from the other side, or, in other words, upside down. The fact that in some cases the children write the letters on their sides would also indicate some such explanation. In order to obviate this difficulty it might be as well to devise some means whereby the letter cards were set up on a vertical or sloping stand, and that the tops of the cards were rounded off so as to make an incorrect position almost impossible. When children are first shown the letters on the blackboard they are at least shown them right side up at the time of one of the most important impressions, and there is not quite the same tendency to reproduce them incorrectly. Any inaccuracy in this latter case can be explained quite simply. The groups of straight and curved lines which go to make the letters and numbers are so familiar to adults that they never think of them as separate elements somewhat complexly related to one another, as they must appear at first to the child. In order to realize to some extent the state of bewilderment in which the child must be placed when faced for the first time with a large number of strange groupings of lines, the adult should devise a series of irregular groupings of lines, with about twice as many elements as go to make a letter, say from six to eight, and he should then try to learn these different combinations as associated with some definite meaning. If available a series of Chinese ideographs or shorthand symbols would make excellent material for such an experiment. This would undoubtedly produce a somewhat more sympathetic attitude on the part of the teacher towards the difficulties of the child who is learning to write. In addition, it must be remembered that the child is still further perplexed by the control of the necessary movements involved in writing.

An interesting suggestion has been made by Gilbreth in connexion with his motion studies for the analysis of skill in various trades. He points out that the co-ordinations involved in doing anything slowly are in many cases so radically different from those required when working at normal speed that beginning to learn something slowly is really a waste of time, since the co-ordinations thus formed have to be unlearned at a later stage and to be replaced by different groupings. Anyone who has had to try and learn to walk slowly, as in the case of the funeral march step in the Army, will realize how different the co-ordinations are. The usual custom in teaching any form of reaction is to insist on accuracy from the beginning and to regulate the speed in accordance with the learner's capacity to produce accurate results, but this other method would suggest that from the very beginning a certain degree of speed should be insisted upon, and that a certain proportion of mistakes be allowed. Of course this presupposes that the desired final form of reaction has been carefully analysed, and the various constituent processes are clearly explained to the learner from the beginning and are insisted on. Gilbreth even recommends this as more economical in the case where the results of the learner's efforts are to form part of the marketable product of a factory, since he holds that the waste involved in the number of spoilt attempts would be much less than that involved by the relatively slower rate of progress made by the learner in the other case, always supposing that the learner is being paid for his work while learning. In ordinary school-work the question of the monetary value of the products does not come in, so that the argument in favour of working up to speed from the beginning is all the stronger. Of course this always assumes that the right form of reaction is kept before the child throughout, and is really a case of emphasizing the process rather than the product.

In order to show that reaction is possible to the children, even in the so-called passive condition imposed upon them by the ordinary school system, the following list of forms of reaction may be given as a suggestion : answering questions, reading aloud or silently, writing and doing sums, drawing, singing, gymnastics, manual training and laboratory work, clay-modelling, kindergarten work, school gardening, field excursions, etc.

CHAPTER II

LAWS OF LEARNING

HAVING discussed some of the possible and actual changes of reaction which do occur in the developing individual, we must now turn to a discussion of the question as to how this modification or change is possible, i.e. we must attempt to formulate the laws of learning.

There have been numerous attempts to state the fundamental laws of learning, but for our present purposes the Law of Use and the Law of Effect should suffice.[1] From this point of view the learning process consists in the gradual choice of the most appropriate reaction to any given situation. When a situation is entirely new, and especially if there is no inherent instinctive reaction to it, then it is very probably a matter of pure chance which particular means of reaction may be chosen. But once any specific reaction has been chosen or *used*, then this one will be more likely than any other to occur on a future experience of the same situation, other things being equal. This is the Law of Use. But any reaction may lead to a satisfactory or an unsatisfactory result. In so far as satisfaction results this particular reaction will have a tendency to be repeated on some future similar occasion, but in so far as dissatisfaction results it will tend to be stamped out. This is the Law of Effect.

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[1] See Thorndike, Appendix B, 28.

From the Law of Use we can at once deduce the enormous importance of the correctness of the first reaction in the case of any form of skill to be acquired, since if a wrong reaction is made, and especially when no particularly dissatisfying results ensue, then it obtains a very strong advantage over the correct form. An example of this, with which we are all only too familiar, is the great difficulty of unlearning any wrong way of doing something which we may have been unfortunate enough to have established as a result of previous falsely directed learning. Another deduction which may be made from the Law of Use is that the teachers who are responsible for the beginnings of any new subject should be the best available, since at this point the pupils have no defensive system of properly formed habits to protect them from the evil effects of bad teaching. A bad teacher cannot do as much harm at a later stage, since the good methods have already an advantage over the bad by the fact that they have been repeatedly used.

The Law of Use also at once indicates that the attempt to correct any mistaken way of reacting by calling attention to the false way is fundamentally wrong. Thus, for example, the all too common custom of publicly pillorying the bad spellers by placing before the class a list of the mispelled words, and even leaving it prominently exposed over a lengthy period, is a case of such an unsound pedagogical practice, which a little reflection on this elementary law of learning should eliminate. The pupils are presumably at the stage of beginning to know these words, and every effort should be made to inculcate the correct spelling on as many different occasions as possible, and to avoid with even greater care any opportunity of stamping in the false impression. The better procedure in this case would be to place a list on the blackboard, or some other prominent position in the class-room, of the *correct* spellings of the misspelt words, and to draw the attention of the children to this correct spelling without even hinting at the possible mistakes. A very vivid experience in this connexion occurred during the author's training as a recruit. The occasion was rifle drill. The instructor was not one of the old army instructors, whose pedagogical methods, based on a long experience with unpromising material, were very sound, but he was a fairly recent recruit himself. There was the customary small squad of about twelve men, and we were all doing fairly well, even though the instructor was piling up the successive movements with considerable speed. But, finally, at the "present arms" one man made a mistake, and the instructor, losing patience with him, called him out in front of the squad, took his rifle from him, and showed him how he had made the *wrong* movements. Naturally enough, the rest of the squad also saw this wrong way of presenting arms, with the result that a number of them, including the author, proceeded to make this very mistake at the next attempt, even although it had not previously occurred to them as a possible way of executing the movement.

But most teachers with any experience realize the potency of this Law of Use, which is at the basis of all good drill-work in schools. They are, however, not so familiar with some of the bearings of the Law of Effect. One very glaring case of disregard of this law is the use, as a means of punishment, of processes which should be learned by the pupils. For example, some teachers allot the writing out of the tables of weights and measures as a punishment for talking in class, and as a result attach a very definite feeling of dissatisfaction to a task which, at best, is not very agreeable. If the particular reaction is one which it is considered desirable to stamp in by repetition and also by accompanying satisfaction, then we are obviously defeating our own ends if we act so directly in contradiction to the second law of learning.

But what is involved in this satisfaction ? What is it that seeks satisfaction ? For the most part it is the group of instinctive tendencies which are seeking a fitting outlet. If the reaction chosen meets the strongly felt need of one of these instinctive tendencies, then it may be said to satisfy ; if it thwarts any need, then it is unsatisfactory.

These two laws state the underlying conditions of learning, but they do not in themselves entirely describe or explain the learning process. In order to do this many other factors have to be taken into account, and we shall now attempt to analyse in some detail the actual processes involved. Here we must distinguish between the very first stages of learning and later types, when there is already a background of experience available to draw upon.

Let us consider the first attempts (at learning) made by a very young baby. How much must we assume as necessary to make this possible ? In order to enable the Law of Use to operate we must assume that there is an innate or inborn tendency to react to stimuli, without necessarily assuming any specific form of reaction to any specific situation. In other words, the baby must have a tendency to do something, however indefinite, in response to the stimuli, which, although vague, still affect it in some way. The outward evidence of this tendency is shown in the baby's restless kicking and squirming, which are without any apparent definite aim. Again, in order that the Law of Effect may operate we must assume some inborn needs to be satisfied in the child, and at first we certainly have the primitive needs of hunger, thirst, and bodily comfort, which demand satisfaction in no uncertain manner. These two assumptions are the only ones which we need to make, provided the body and muscular and nervous systems of the child are present even in an unorganized form.

With such a state of affairs there is only one method of learning possible, and that is the very slow method of "trial and error." Before the baby has made any reaction to a new situation there is no one reaction which is more likely to occur than another, and were there no inherent tendency to react somehow, the baby might remain quite passive and never make any progress whatever. But since there is this tendency to do something, some reaction is made haphazard, and as a result the needs of the child are either satisfied or they are not. If they are, this reaction immediately gains an advantage over other possible reactions, and is more likely to be the one chosen in the case of a recurrence of the same situation, or even of a similar situation. If, on the other hand, no satisfaction results from the first reaction, then another is tried again by haphazard, and so on until some satisfaction is achieved or the child becomes tired.

When we say that a reaction leading to satisfaction is likely to be preferred on the recurrence of the same or a similar situation, we are assuming that the child has a means of recognizing the situation when it recurs, and thus we have to assume memory of some kind, however primitive it may be. Indeed, were there no form of memory then every situation throughout the life of the individual would remain a *new* situation, and "trial and error" would be the only method of learning possible. As it is, in any case where the situation is so novel as not to show any points of similarity with a previous situation, even an adult is driven back to the method of "trial and error." Of course this very rarely occurs in the experience of anyone under normal conditions of life. An approximation to this state of affairs may be obtained by asking someone to try and follow the outline of a figure which they can only see in a mirror. If they obey the instruction to keep moving and not try and work out the next move on any knowledge they may possess of the laws of reflection, the state of helplessness into which they will sooner or later be thrown, if they come to a point where they do not hit on the correct direction of the line they are trying to follow, must resemble, to some extent, the confused state of anyone who is really driven to adopt the "trial and error" method.

If the individual does not die during the process the method of "trial and error" will in the end lead to some kind of satisfying reaction, but were we compelled to learn everything by this method we would make but very slight progress. Fortunately for us there are several short-cuts to learning available once we have passed the first stages. These are made possible by the various mental processes which we have described in the earlier sections. Thus attention, imitation, imagination, and association all play a helpful part in speeding up the learning process, mainly by limiting in one way or another the field of choice of probably successful reaction to a given situation in the light of previous experience. Thus, if in any partially new situation we recognize any elements which formed part of a previous situation to which we have found the successful reaction, then we will tend to choose for our reaction to the new situation some form similar to the previously successful one. Of course we cannot tell until we try if the reaction chosen will be the best one, but we at least have some basis of selection from the practically infinite number of possible reactions which might otherwise suggest themselves. Thus, if anyone found himself shut up in an entirely unfamiliar room, he would not make completely haphazard attempts to escape, but he would look around for anything which in any way resembled a door, and on it would try to find some form of handle, and so on. If this did not lead to success then he would try for a window. In this way his especial reactions would depend on an analysis of the new situation in the light of his past experience of similar ones.

But entirely apart from our previous experience of situations similar to the one in which we now find ourselves, there is another means by which the range of our possible reactions may be limited, and this depends on imitation, which is in this way one of the most efficient accelerators of the learning process. Thus, when we are faced with a new situation there are often other persons present to whom the situation is familiar. In this case we watch what they do, and then try to imitate as nearly as possible what they have done, e.g. the case of the first experience of an array of forks, etc., at a dinner. This does not mean, as we all know to our cost, that we are immediately able to choose exactly the right reaction, but it does mean a distinct limitation in the field of our trials and a simply enormous saving of time and effort on our part in learning the new form. It is very important to remember, however, that until we actually try the reaction for ourselves we cannot be sure that we have learned it.

In the case where there is a teacher who is deliberately seeking to help the learner there is yet another means of limiting his responses. Without actually telling him which way he should react, the teacher can often limit the field, while still allowing the learner a certain amount of freedom to choose the reaction, and thus make it more nearly his own. In most cases the teacher has considerable control over the nature and amount of stimuli which shall act on the child's mind at any moment, and in the case of a new stimulus he can see that the proportion of new and old in the new experience is so adjusted that the general direction, at least, of the desired reaction is suggested to the child from his previous experience. He should then leave the child entirely alone to work out for himself the best form of reaction, because it is only in this way that the child will really be learning. If necessary the teacher's approval may also function as part of the satisfying element in a correct and successful choice, although even this is unnecessary if the proper kinds of situation are chosen to suit the age and tastes of the child. In this case the satisfactory completion of the task in itself should be ample reward for the energy expended, and should, in addition, stimulate to further activity.

Of course there still remains the most extreme form of limitation, where the teacher does not leave any opportunity for a possible false reaction, but tells the child at every stage exactly what it should do. This does away entirely with freedom of choice, and indeed no longer means that the child is reacting to the new situation but merely to the commands or instructions of the teacher, which, to be successful, must be couched in familiar terms. In other words, the child is not learning to think and work for himself, but is only learning to do what the teacher tells him to do. In certain cases this latter state of affairs may be desirable, and it will be discussed later in connexion with the influence of the immediate aim on the method of teaching and learning.

Before discussing further refinements in the process of learning by human beings, some illustrations of animal learning under experimentally controlled conditions will serve to indicate a few of the distinctions between human and animal learning, and the way in which the former has evolved from the latter. The two commonest means for the experimental investigation of animal learning are the maze and the puzzle-box, and the incentives to activity in either case are hunger or desire for companionship. The animal is placed either at one end of a maze with its food or companions at the other end, or else in a puzzle-box with the food outside, where the only means of escape is by executing certain specified movements in a certain order, such as the pulling of a string, the stepping on a platform, the pushing of a door, and the like. If the animal is placed in either of these situations it usually begins by madly dashing about in its efforts to escape, which are, as a rule, fruitless at first, but sooner or later it hits upon the proper succession of reactions to attain success and freedom. After a sufficient interval to ensure the renewal of the incentive to activity the process is repeated, and again the animal acts as before. But if, in the course of successive efforts to escape from the same maze or box, a record is kept of the time taken and the movements repeated or eliminated, it is found that the time progressively decreases and the number of errors or unnecessary movements also grows less, until finally a stage is reached where all unnecessary movements are eliminated and the maximum possible speed is attained. During the whole of this process the only suppositions required to explain it are the presence of the initial incentive to get out and the operation of the laws of use and effect in the process of the gradual elimination of the useless and unsatisfactory or unsuccessful movements. Thus the initially vague and haphazard series of movements is gradually narrowed down until the successful series is carried out, with an immediately satisfying result.

A slight extension of this experiment enables us to investigate the possibility of the use of conscious imitation as a short-cut method by animals under such circumstances. Thus, if we place another animal somewhere near the one who is learning by the slow process of trial and error to get out of some such situation, in such a way that the second animal can plainly see all the efforts of the learning animal and their success or failure, then we might expect that the second animal on being put through the same process, would profit by the first animal's experiences, and, by imitating his ultimately successful movements, would at least considerably shorten its own learning time. But, as a matter of fact, no such shortening has been shown under such experimental conditions, whereas in any case where one person watches another work out the solution of a puzzle of any sort there is undoubtedly a very considerable shortening of his own time of solution, due to the very marked restriction of the possible field of reaction, even although the exact move which brings success may not be hit upon immediately. Of course the above experiment by no means eliminates the possibility of spontaneous imitation acting as a factor in the learning process of animals, but it certainly casts considerable doubt on any pretence that animals learn specific reactions to given new situations as the result of deliberate voluntary imitation. That the oft-quoted case of imitation when sheep jump a fence does not involve any clear consciousness of the purpose of the first jump, and hence come under the category of voluntary imitation, is shown by the fact that the last sheep in the flock continue to jump at or near the place where the fence was, even if in the meantime the obstacle has been removed.

Another extension of the experiment throws light on a further aspect of the difference between animal and human learning. In this case an animal which has successfully mastered the intricacies of one maze or box is then placed in a new maze or box and the course of its learning observed in the same way. Under the new conditions the animal seems to be as helpless as it was at the beginning of the first experiment, and there would thus seem to be very little carry over of the experience gained as a result of the efforts made in the first case. In other words, the animal has not drawn any general conclusions as to the probably profitable lines of reaction to be adopted in the face of the general situation.[1] On the other hand, all the mental processess of association, memory, satisfaction, and the like have been referred to the specific situation of maze or puzzle-box number one. This process of generalization from previous experience, which thus appears entirely absent in the case of animal learning, is one of the most characteristic features of human learning. It functions in at least two different ways. In the first place, when a human being makes a mistake or an unsuccessful attempt to solve some given problem he is not content, as a rule, with being annoyed and resolving to eliminate this one form of unsuccessful reaction, but he attempts to generalize from a specific failure by assigning some cause to it. In this way he may not only eliminate the one specific mistake, but, if he assigns the proper generalized reason for his failure, he may at one and the same time eliminate a whole group of similar reactions for the same general reason. This naturally results in a very considerable shortening of the process of learning, with a corresponding saving of time and effort in any given case. But, in the second place, this process of profiting by one's mistakes may also carry over from one learning process to another, with the result that before he even begins to try to solve some new problem a man may have already considerably restricted the field of possible effort as a result of some generalization or generalizations from previous experiences with similar problems. This is the reason behind the aphorism that " He who has never made any mistakes will never make anything else." But it is important to notice that it by no means follows that in all cases he who does make mistakes will make something else, unless we add the important proviso that when he originally made the mistakes he immediately set himself to work out the general reason for his failure, and that he also kept the result of this reasoning in mind and verified it by application to other cases of a similar nature.

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[1] The description of the feeble-minded in Goddard (Appendix B, 10) is very similar to this.

Another illustration of animal learning which shows the possibility of modification even at their level is the following. A monkey in a cage is shown a banana at the bottom left-hand corner of the front of his cage, and naturally, being a monkey and liking bananas, he promptly makes a jump and a grab towards it. This may be taken as the natural reaction of the monkey under the circumstances; but experiment shows that this can be modified by an application of the law of effect and that the monkey may finally be brought to jump away to the furthest corner of his cage at the sight of the banana. The way in which this is gradually worked out is that every time the monkey jumps towards the banana it is removed, with the resultant dissatisfaction. The monkey then usually becomes angry and jumps all over his cage, until by chance he happens to land in the farthest away corner. As soon as this happens he is given a piece of banana, with consequent satisfaction. If this process is repeated often enough there finally comes a time when the natural reaction is entirely eliminated, and the opposite reaction is substituted for the original one on the basis of satisfaction. This is an example of the gradual shift from one form of reaction to a given situation to another entirely different form. But we can also have the shift from one form of reaction to a given situation to the same reaction to an entirely different situation, by the process which Thorndike[1] calls associative shifting. Thus if the original situation *abcde* be met with the reaction X, by innate instinct or acquired habit, where *a, b, c, d,* and *e* represent the different components in the situation, then it is possible to call forth the reaction X to the partially different situation *abcfg*, and even at a later stage to the entirely new group *fghij*, if at all times due allowance is made for the operation of the Law of Effect. In fact, this is merely a case where the conditions are so arranged that the Law of Effect acts more powerfully than the Law of Use. On the practical side it suggests the best way to change the particular type of situation which some form of innate or acquired tendency chooses as its outlet. As has been emphasized elsewhere, we may often have an innate tendency habitually seeking an antisocial, and hence undesirable, outlet, and we may wish to change the outlet to a more desirable form. From the above we see that the best means to attain this end is gradually to alter the outlet in the desired direction, taking care that at each stage greater satisfaction attaches to the choice of the more desirable outlet. If this is done systematically, then quite extraordinary results may follow.

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[1] Appendix B, 28.

CHAPTER III

RESULTS OF THE LEARNING PROCESS

IN the last chapter the general laws of learning were outlined, and in this chapter an indication is given of some of the ways in which the learning process affects the individual, apart from the increase in skill which is quite rightly expected from an application of the process in any particular case. The specific subjects discussed are habit, the plateau of learning, transfer of training, and the influence of the immediate aim of any learning process on the method or means to be adopted.

HABIT

Most of what has already been said with regard to the general laws of learning refers directly to habit formation, which, after all, is nothing more than one form of the learning process. But there are certain special psychological features in connexion with habit which warrant a separate discussion. In the first place, the change in the amount of attention required at the different stages in habit formation should be noted. At the initial stages practically all the person's attention has to be devoted to the special habit, to the necessary exclusion of all other processes for the time being. Thus, in learning to walk or dress ourselves, we require at first all our attention, but as the process becomes more familiar and habitual it retires to the very fringe of consciousness instead of occupying the focus of attention, and as a result this focus is left free for other and probably more important things. Thus, at the later stage such processes as walking to a certain place have only to be set off consciously, and after that they proceed more or less automatically, leaving the mind free to think of other things. This is the chief advantage of habit formation in our mental life. Were we compelled all our days to devote the same amount of attention to the elementary processes of standing, walking, and the like, we would never be able to do anything else than merely exist. But, on the other hand, there is a negative side to the process of habit formation in that it makes it increasingly difficult to modify our reactions to certain situations, even although we are well aware that there is a better form of reaction to the given situation. Thus in my own case I unfortunately learnt to typewrite on an empirical basis of picking out the necessary keys and using only one or two fingers, and even although I am quite convinced that the touch system, where all the fingers are used and the eyes are left free to do other work, is undoubtedly a superior method, I am nevertheless so tied to my original form of typing that I hesitate to expend the time and effort which would be necessary for me to unlearn the first way and to adopt the better way. It is in this fashion that habits can be a distinct disadvantage to one in the learning process.

Looked at from the point of modifiability, habitual reactions ultimately pass into the category of practically unmodifiable reactions and thus resemble the inherent instinctive tendencies or, even in extreme cases, the absolutely fixed reflex actions. Thus habits, while they on the one hand are a form of economizing mental effort in the adult by rendering the large proportions of his actions automatic, at the same time definitely reduce his plasticity and consequently his educability ; and this is one of the main reasons why older people who try to study find it so much harder than young people, because, in popular terminology, they have become so set in their ways of thinking, feeling, and acting.

But habits never reach the stage of absolute fixity, and there is an interesting contradiction in opinion with regard to the necessary procedure for the breaking of an old habit or the formation of a new one. One group of psychologists, and most notably James, recommend " a little gratuitous exercise every day," or " to be systematically heroic in little necessary points, do every day or two something for no other reason than its difficulty, so that when the hour of dire need draws nigh it may find you not unnerved and untrained to stand the test." On the other hand, we have those who hold that it is better to try and break a habit by removing as far as possible all opportunities for its exercise or even the suggestion of its exercise. Thus a smoker who wishes to break the habit should remove as far as possible all the customary stimuli such as pipes, ashtrays, and even if possible matches. This is at the basis of the principle of prohibition, with, of course, the further proviso that the growing generation would not be allowed to have the opportunity of forming the habit in the first place. James's rule for the would-be teetotaller would be to pass deliberately the places where he had previously indulged.

If anyone wishes to realize the tremendous strength and tenacity of a habit once formed, the following simple experiment is highly illuminating. Select some minor habitual form of reaction which has become fixed in your life. Choose one which occurs fairly often each day, but not so frequently as to distract you entirely from all other work, e.g. the method of crossing a street. Then make up your mind to change this habit in some way, and note each day the number of times the opportunity occurred for the exercise of this habit, and also the number of times in which you succeeded in adopting the new way of reacting. If this experiment is continued for a month, and a careful record is kept of the percentage of success, it will very rarely be found that even at the end of the month there has been a hundred per cent. success for two or more days in succession. Any teacher who has carried out this experiment conscientiously will not be so inclined to scold his or her pupils for not doing what they were told even after six or seven tellings, if there is any evidence that they had previously formed a habit of doing it in some other way. Further, such a teacher would realize the enormous importance of selecting from the very first the best way of doing anything, and insisting on strict adherence to this way in spite of the possible discouragement of apparent lack of progress in the initial stages.

PLATEAU OF LEARNING

It is only natural that teachers who have to deal with the actual problems which arise in the course of their practical work should ask for definite rules to guide them, which are based on the results of experiment instead of merely on the expression of opinions deduced from a more or less wide theoretical study of the subject. But experimental education is as yet in its infancy, and in the majority of cases the work so far has only served to disclose the problems which have to be solved, and in some more advanced stages may even have suggested further fruitful lines of research. But in most cases any final deduction of rules for concrete situations as they arise in practice is scarcely justified as yet. The so-called "plateau of learning" is a very interesting example of the provisional stage which we have so far reached in many cases. The fact that there is such a plateau in many forms of learning has been definitely established, but two equally good explanations have been offered for its occurrence, which lead to two diametrically opposed rules for practical application, and as yet no form of experimental procedure has been suggested that would lead to a decision as to which of the two suggested explanations is the proper one.

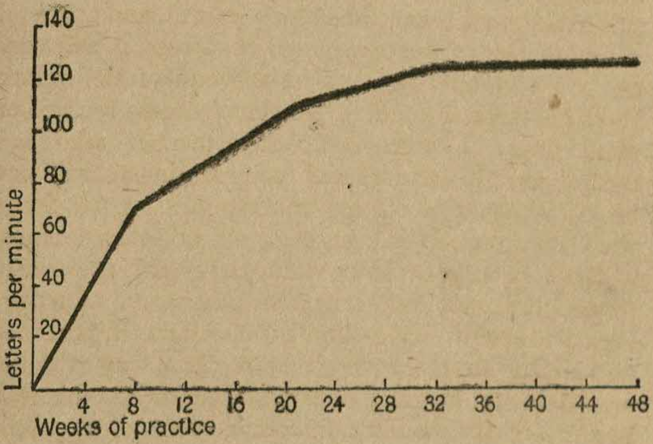

FIG. 2.—Normal Practice Curve (Telegraphic Sending) (After Bryan and Harter).

In any case where some objective measure, such as speed, is kept of the progress made as a result of continued practice in the learning of some new form of skill, it is usually found that progress is very marked in the earlier stages, but seems to slow down more and more as practice continues, until practically no further progress is observed. Thus Fig. 2 came to be called the normal practice curve, and the explanation of the flatness of the later part of the curve was given in terms of the physiological limit of speed beyond which the individual could not progress. But more extended investigations, of which that by Bryan and Harter[1] on speed in receiving and sending messages in the telegraphic code was the first, have shown that this curve does not represent the whole of the process in many cases. Had they remained content with a study of the first fifteen to twenty weeks of the learning of the telegraphic code, they might have considered that the normal curve of

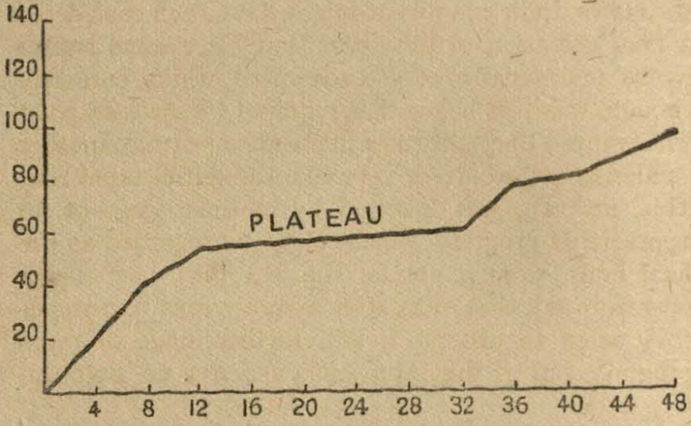

FIG. 3.—Practice Curve with "Plateau" (Telegraphic Receiving) (After Bryan and Harter).

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[1] See Thorndike, Appendix B, 28.
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practice represented the case both for sending and receiving as it does actually for sending; but as a result of their extending the investigation to a longer period of about forty weeks, they found that the curve of progress for receiving telegraphic messages showed an interesting divergence from the normal curve of learning (Fig. 3). In the initial stages there was the usual rapid progress, and then followed, after about twelve weeks' practice, the usual flattening out of the curve, indicating what might have been considered a final cessation of progress; but after some twelve weeks' maintenance of a steady speed, which, curiously enough, was just below that required for a telegraphist who wanted to qualify as a main-line operator, another sudden spurt occurred, very like the initial rapid rise. This, in turn, was followed by another stage of no appreciable progress, which might be regarded as the final limit, were it not for the fact that very expert operators say that even after several years' experience they seem to observe a still further stage of rapid progress, but of this later stage we have no quantitative data.

Before giving the two explanations of this phenomenon it may be noted that the fact that this first plateau or stage of arrested progress occurs in a very tantalizing fashion just below the main-line rate seems to prove that lack of pecuniary incentive to further progress cannot be adopted as an explanation of the temporary stoppage. The explanation given by Bryan and Harter of the plateau is based on the assumption of what they call a hierarchy of habits. Thus they say that there is the habit of taking the messages letter by letter, which they call the "letter habit," and which represents the lowest order habit in the hierarchy. Then follows the "word habit," and finally the sense or "word group habit." They say that the higher order habits cannot be used until the lower order habits have been rendered more or less automatic, and thus leave the attention free to develop the higher order habits. The plateau represents the stage at which one of the lower order habits is being made automatic by means of repetition, and the stage of rapid advance after the plateau is due to the fact that the higher order habit is now coming into action and enabling the operator to work at a very much greater speed than before. They quote some very interesting introspections by operators of varying degrees of skill in support of this hypothesis, and even give some experimental results, in which they show that the individual's capacity to take letters which do not form words and words which do not form sentences does not keep pace with his capacity to take meaningful material at the stage succeeding the plateau. But the supporters of the other explanation do not consider this evidence as decisive.

The practical rule to be deduced from this explanation as to the teacher's best means of getting his class past a plateau, whenever he suspects that it is at such a stage, is "Drill, drill, and still more drill."

Now, the other explanation which is offered of the plateau is based on interest and attention, and more especially the influence of novelty. One of the recognized means of attracting so-called passive attention is by presenting some new situation or stimulus to an individual. Further, the result of attentive learning is better than the result of inattentive learning. Indeed, the latter may in many cases lead to a deterioration in skill rather than the expected improvement Now, when anyone begins to acquire some new form of skill there is undoubtedly the factor of novelty, which may last for some considerable time, but sooner or later in any form of prolonged practice there must come a time when the novelty wears off and some other incentive must be used, as, for example, the earning of one's bread and butter. At this stage of lagging interest the plateau is supposed to occur. But how comes it that the person who has once reached this stage ever succeeds in getting beyond it, as is shown in the rapid rise of the curve after the plateau? Novelty and interest are again used to explain this, and in a rather ingenious fashion. Obviously the activity itself can no longer be new; but the method of attack may suddenly change, in most cases by pure chance, and as a result the element of novelty thus accidentally introduced produces a recurrence of interest with a consequent stage of further progress due to attentive learning.

If this explanation is the correct one, and there is as yet no conclusive experimental evidence on either side, then the practical rule to be deduced for the teacher's guidance is diametrically opposed to the rule previously given. In this case the teacher should not attempt to bring his class away from the stagnation of a plateau by incessant drill, with its tendency to monotony, but he should, on the other hand, do all he can to reintroduce the factor of novelty by trying to show his pupils some new aspect of the problem, or some new short-cut way of performing the particular task set.

In the meantime the only possibility for the teacher is to adopt a judicious mixture of the two procedures and hope for the best. On the other hand, the knowledge that such a plateau does occur even under the best conditions of training may prevent many a teacher from becoming unduly desperate if his class shows signs of arrested progress, which seems for a time to defy his best efforts, after an initial encouraging stage of rapid advancement.

One peculiar feature in the acquisition of any form of skill is the effect of a *prolonged pause* in the learning process. If before such a pause a sufficient amount of progress has been made, then at the end of the pause, on taking up the particular form of skilled action again, there is in many cases not, as one might expect, a falling off in the skill of performance, but even a quite appreciable improvement. So marked is this that James was led to characterize it by the phrase that "We learn to swim in winter and to skate in summer." The explanation which is usually given of this phenomenon is that the various component parts in any form of skilled action have a different rate of forgetting. Thus the fundamental components are retained better and longer while the incidental components, which are as a rule unintentionally added in the course of continued practice and which are just as likely as not detrimental to the best performance, are not retained as well, with the result that on the resumption after a long pause only the fundamental movements tend to be retained, and thus a much better performance ensues. Mannerisms and tricks of action which gradually and unintentionally creep into the performance of anything, such as a golf swing, are examples of these unnecessary incidental components which tend to disappear after a long pause. In certain cases the beneficial effects of the pause may be due partially to the factor of "mental incubation" discussed elsewhere.

FORMAL DISCIPLINE OR TRANSFER OF TRAINING [1]

The inclusion of certain subjects in the school curriculum which cannot be justified on the ground of their inherent or direct usefulness in the after-life of the individual is often justified on the plea of the formal discipline which they are supposed to provide. Thus mathematics is supposed to train some hypothetical general reasoning power, and similarly nature study is sometimes advocated as training the observation, and so on. Now, although psychologists do not for a moment deny that nature study, if properly taught, does undoubtedly improve the accuracy and detail of the observation of plants and animals, they for the most part raise the question as to what extent, if any, this training of the observation of one specific type of material is transferred to any other type, however closely related it may be to the material to which the attention has been drawn. Thus it has been found by experimental methods that a group of students with special mathematical training were not at all better in reasoning about matters of every-day occurrence than a similar group of students with no special training in mathematics. And the results of a large number of similar experiments with various types of material and different ways of studying them seem to bear out this lack of spread or transfer of training. But in spite of this the practical teacher and the man in the street maintain that there is an actual transfer, and go on to quote several specific instances to support their contention that training in one subject results in a corresponding improvement in some similar subject. Thus, for example, the case of the boy who has been trained in Latin and has done well, and then has shown great proficiency in Greek, which he has taken up at a later stage in his schooling, is quoted as corroborative evidence for the transfer of training. But in such a case the reason for the excellent results in both Latin and Greek may not be due to training at all, but may in both cases be due to a special innate capacity of the boy for linguistic subjects, and the boy would possibly have achieved as great success in Greek without any preliminary study of Latin. One of the earlier experimental methods of investigating this problem was to measure the efficiency of a group of individuals in applying some mental process to two types of material, A and B, and then giving them a definite course of training in this process with A, but not with B, for a certain period, and then again testing their efficiency both with A and B at the end. An improvement was usually noted in A, and sometimes even in B, though usually not to the same extent. The rash assumption was then made that whatever improvement was noted in B was due to the training in A. Now, in this method no precaution was taken to determine whether the improvement in the untrained subject B might not be due to the increased maturity of the individuals concerned. This factor of improvement due to increased maturity does not affect experiments with adults to any appreciable extent, but is of considerable weight in any experiments with children, even though the time between the first and last tests is only six months. The more recent experimental work on this question has attempted to take into account possible improvement due to other factors than training by the use of "control groups." After the initial tests, instead of proceeding to train all the persons in the group as in the earlier experiments, a selection is made whereby we obtain two groups of equal size and as far as possible of equal initial capacity in the tests. This is usually done by placing all the persons tested in a rank order and then choosing every second person for the training group and leaving the rest in the so-called "control group." The training group then undergoes a process of training as in the earlier experiments, while the control group is subject to identical conditions as far as possible, with the exception of the specific training whose influence is under investigation. At the end of the training period both groups are again tested, and in this case we do not take the absolute differences in performance of the training group in their last tests as compared with their first tests, but the relative differences compared with the differences, if any, shown by the control group who have not been trained. In this case any improvement shown by the untrained control group is ascribed to the development which is independent of training, and the possible effect of training, as distinct from greater maturity or the like, is indicated by any greater increase in the efficiency of the training group. Experiments carried out in this way with sufficiently large groups tend to confirm the previous findings as to the very slight nature of any transfer of training.

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[1] See Rugg, Appendix B, 20.

It has been suggested by Bagley[1] that the popular opinion as to the transfer of training may be due to another factor hitherto unconsidered in these experiments, namely, the establishment of an ideal, which might lead to the tendency to establish similar habits in two closely allied situations. Thus when an attempt was made to see if insistence on neatness in arithmetical work, which resulted clearly in an improvement in such work, would also result in a corresponding increase in neatness in English without any special emphasis on neatness in this other school subject, it was found that there was no appreciable improvement. But when the teachers in arithmetic did not merely insist on neatness in that specific case, but also tried to form "ideals" of neatness in their pupils, there seemed to be some evidence of transfer from arithmetic to English.

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[1] Appendix B, 1.

This problem of transfer of training is unnaturally emphasized in any school system which organizes its curricula on the basis of watertight compartments, and it will be very interesting to see if one of the results of present-day attempts to organize curricula more as organic wholes may prove to be a greater ease of spread of training from one branch to another. Thus, for example, in a curriculum which is organized round one or two wide "projects," whose solution demands the use of all the usually separated branches of the school curriculum, may we not expect this community of end in all the processes involved to exercise a unifying influence over the child's attitude towards the various subjects, and thus to facilitate a spread of training from one subject to another?

THE INFLUENCE OF THE IMMEDIATE AIM OF EDUCATION ON THE METHODS AND MEANS TO BE EMPLOYED

As distinct from the ultimate aim or aims of education which can only be determined on a philosophical and more especially a sociological basis, the immediate aim of our educational efforts must vary not only from subject to subject, but even within the limits of one and the same subject. Thus, for example, our immediate aim may be the formation of correct habits in the mechanical execution of some form of skill, or it may be, on the other hand, the formation or rather development of the capacity for independent intelligent thinking with reference to some specific type of situation. In arithmetic we may wish to secure practically automatic accuracy in response to the various situations such as 2 + 2, etc., or, on the other hand, we may desire to establish the capacity for solving independently the various types of arithmetical problems, where, in addition to the accurate use of the mechanical operations, the intelligent choice and discrimination of the particular operation or operations necessary must be made. The methods employed in the one case with considerable success will in all probability lead to negative results in the other. Thus where our aim is the establishment of the accurate automatic association in the most economical way with the least possible expenditure of time and energy on the part of the teacher and pupil, the fundamental laws of learning and habit formation show the great importance of securing the correct association from the very beginning, and thus all the teacher's efforts must be directed towards the prevention of wrong reactions on the part of the pupil, especially in the initial stages, and this can only be done by a strict delimitation of the possible reactions on the part of the pupil, and a continual emphasis on the correct reaction throughout. But if we wish to develop an independent problem-solving attitude, the very worst thing that we could do would be to limit unduly the field of choice of reaction for the pupil, since the successful independent solution of problems or the working out of "deductions" depends mainly on the correct choice of the reaction, once the necessary facility in the purely mechanical operations involved has been attained. Thus the frequent practice of giving two or three examples of one type of problem showing exactly the operations involved, and then giving a long series of problems involving the same combination of operations as in the stock examples, does not in the least tend to develop a proper problem-solving attitude, since a pupil may succeed in solving the whole of the problems without any intelligent adaptation at all beyond the retention of the method employed in the illustrative examples and an entire disregard of the setting of the individual problems. The results of this method are only too clearly shown when the usual set of miscellaneous problems is attempted. In this case many pupils who have successfully obtained the correct answers to a very large number of problems, all carefully administered in already selected groups, without any independent thought at all, are now hopelessly at sea when the choice of reaction is no longer made for them, and they have to determine for themselves which set of operations to use in the solution of the problem. The result is often a series of the wildest guesses based sometimes on some purely fortuitous verbal similarity between the new problem and some vaguely remembered previous problem. Had the pupil in the first instance not been so definitely limited to one type of reaction, but had he been allowed to choose his own reaction and even to have made a mistake, the reason for which he had then to seek out with the teacher's assistance or guidance, then there might have been a chance for the development of an independent problem-solving attitude.

Thus we see that from the very beginning our methods must vary in accordance with our immediate aim, and that any attempt to lay down one universal method as an educational panacea is fundamentally at fault. The method employed in one of the Courtis arithmetical reasoning tests might well be applied to give training in the proper choice of the way of solving any given problem without spending time on the mechanical operations involved in the actual solution. Thus a series of miscellaneous problems might be presented to the student and instructions given that the arithmetical processes required for the solution should be named, but that the answer was not to be worked out. Thus in the problem, " Tommy has five apples and gives Jim two ; how many has Tommy left ? " the process involved is subtraction.

SECTION IV

CHAPTER I

THOUGHT PROCESS

ONE of the immediate results of any properly devised system of education should be the production of an individual capable of more or less independent thinking. But before we can determine whether our system of education is achieving this result we must state in a definite manner what we mean by thinking, and we must do this with a view to its application to the educative process. Two characteristic statements of this kind may be chosen for discussion in this connexion, viz. that of Herbart and that of Dewey. We shall only discuss Herbart's theory of apperception in so far as it is crystallized in the "five formal steps" as a general basis for the presentation of any subject whatsoever, and shall contrast it with the outline of the thought process as laid down in Dewey's "How we Think." According to Herbart all new experiences are interpreted in terms of the old, and indeed he goes even further and credits the old ideas present in the mind with an active power of assimilation towards the new. This process he has named apperception. Considering this with more direct reference to education he maintains that the function of the teacher consists in arousing the appropriate set of ideas from amongst those already in the pupil's mind which will best tend to assimilate correctly the new experience which he knows is going to be presented to the child. Working this scheme out to its logical conclusion, he and his followers devised what they considered to be a universally applicable scheme for any and every lesson. They postulated the following five formal steps :

1. Preparation.
2. Presentation.
3. Association.
4. Systematization.
5. Application.

In the first step the child is to be prepared for the new material, i.e. the appropriate system of familiar ideas is to be brought to the forefront of attention by questioning or other means. In the second step the new material is itself presented. In the third step it is then compared or associated with the particular system of older ideas, known as the "apperceptive mass," and as a result it is either assimilated or rejected by this mass, which in consequence is modified in either case. This modification in reality amounts to the formation of a new system, or at least to a widening or narrowing of the previous system, and thus brings about the fourth step of systematization. But the process cannot be considered complete until this changed system of ideas has been verified by its application to further concrete cases.

On the other hand, Dewey gives the following outline of the thought process, which, although it agrees in many respects with Herbart's apperceptive process, still involves some quite radical differences in its application to teaching. Dewey also selects five stages in the thought process. They are briefly stated as follows:

1. A feeling of difficulty.
2. The location or definition of the difficulty.
3. Suggestion of a possible solution.
4. Reasoning on the bearings of this solution.
5. Observation and experiment leading to acceptance or rejection of the suggested solution.

The last two steps correspond fairly closely to the same steps in Herbart, but from the point of view of the teacher the first two, and even to a certain extent the third step, entail a radical distinction. Thus, according to Herbart, the teacher foresees the new situation with which the child is to be confronted and takes measures to have the appropriate mental resources of the child available to meet it. In Dewey's outline it is the child himself who must be aware of the difficulty or the new situation, and he must *himself* seek to locate exactly or make more definite the nature of the difficulty, and he must even himself find or guess the correct solution with the minimum of guidance from the teacher. In other words, in the one case the appropriate apperceptive mass is already present, while in the other the child himself has to discover independently the particular factors in his previous experience which will serve to help him in the new situation. As far as preparation for adult life is concerned this second method would seem to have a distinct advantage, since anyone who is not going to live all his life in dependence on someone else will certainly have to face unexpected situations for which he will not have the appropriate apperceptive masses ready, nor will he always have a teacher at his back to suggest the appropriate solution of the difficulty. This question of adaptability to a new situation recalls the definition of intelligence already quoted from Stern. On the other hand, it may be argued that a child left very much to himself, as under Dewey's method, might be trying a large number of wrong ways of meeting situations, and thus establishing habits difficult to overcome in after-life; while with the limitation of response under the Herbartian method the possibility of error in the very important first attempts is greatly reduced. The way out of this difficulty, which is suggested by Dewey[1] in another connexion, is not to seek direct control over or direction of the child himself, but so to limit his environment and the situations to which he can react that the possibility of a radically wrong reaction is very greatly minimized. In this way the child is exercising internal or self-control from the very earliest stages, and is establishing the habit of independent thought from the beginning. The ideal state of affairs whereby he can ultimately think for himself under all conditions can be gradually approached by an ever-increasing freedom in the environment to which he is reacting. We might compare this latter view to an attempt to train a horse to be self-controlled in any situation whatever by never using a harness, but beginning by allowing it complete freedom in some such confined environment as a stall, and then gradually extending the environment through the successive stages of loose box, yard, paddock, large meadow, open moor, to absolute freedom. The reader will at once say that this would be a ridiculous way to treat a horse; and while we are quite prepared to grant this, we at the same time hold that it is as ridiculous to think of trying to train a child to be an independent thinker by some means which constantly insists on some form of mental harness.

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[1] Dewey, "Democracy and Education," Chap. III.

If one lays the chief stress on the product, i.e. knowledge, obtained as a result of education, and especially on its uniformity with children who have passed through the same amount of training, then some such method as that outlined by the Herbartians has undoubtedly a great advantage. But if, on the other hand, one stresses the mental processes involved, and the consequent mental development of the child, then there can be little doubt that the method suggested by Dewey will yield the more satisfactory results.

One of the chief difficulties in applying the latter method lies in the fact that the teacher does not feel so definitely that he is actually teaching the child, when he only controls him indirectly by controlling his environment and allowing him freedom to choose his own particular reaction to that environment. The Montessori didactic apparatus is a very good example of a "loose box" environment, but it still remains to be proved that this is the one and only form of limited environment which will yield the desired results as the more ardent Montessorians seem to maintain.

Another point in connexion with the application of Dewey's theory of the thought process is his emphasis on the fact that without the feeling of some difficulty or problem to be solved no real thinking can take place. And what is more, this difficulty must have a personal reference. It is no use imposing difficulties from the outside. This means a radical change in the general attitude towards the curriculum. Instead of asking what we as teachers consider to be the problems which a child should be set to solve, we should ask what are the child's own felt difficulties and how can we give him the opportunity of solving them for himself ?

Several attempts are at present being made to apply in practice the psychological principle that work which is organized around some vital interest of the children will be more effective in education. In the first place, the division of the time-table on the basis of set school subjects, such as reading, writing, and arithmetic, etc., should be abandoned and some other principle of organizing the curriculum should be adopted.

One of these new principles, which may be adopted in whole or in part, goes by the name of the " project method " in America, where it has reached its widest development. The method of " regional surveys " which is being strongly advocated in England at present is an example of the project method. The essential principle of this method is that the activities of the children are centred around some project or projects instead of being centred around some artificial and externally imposed task, such as the learning of the rule of three. As examples of projects may be cited the cases of poultry-raising with the necessary book-keeping, construction work, and technical reading involved ; studying the rotation of crops, or the adaptation of different types of land to its most appropriate uses ; the editing of a school magazine ; writing a history of the French Revolution in the form of a daily newspaper supposed to appear at the time ; the equipping of a school gymnasium by the pupils' own efforts ; working out schemes of self-government ; writing a book on the geography of one's own county or country ; planning the acting of a play ; running a school library or a bank; and countless other schemes. In such cases the teacher has to keep a careful watch that the necessary amount of the instrumental subject, such as the three R's, is learnt as an essential aid to the proper execution of the projects undertaken. If this system is properly controlled there is no doubt that the children learn much more, and, what is more important, that all that they learn is definitely bound up with some vital interest.

Unfortunately, such a system calls for very much greater skill on the part of the teacher than the present organization of the curriculum around a group of traditional subjects, since the work of the children will be very much more individual and care must be taken to see that no essential part of the child's general training is unduly neglected. If such a scheme is adopted, and the children are really allowed some freedom of choice in their projects, and the teacher tries to see the educational possibilities in some activity which may seem at first sight but slightly related to education, then there will at least be a remarkable increase in the enthusiasm and interest of the children in their work. The teacher's problem is no longer how to present a certain amount of prescribed material in such a way that the child shall be most likely to learn it and possibly make it his own, but how to turn the natural stream of the child's own activities into such channels as are most likely to be educative. Even in the narrower sense of the necessity to teach some specific form of skill, such as addition, it is much better to let the child find out that he can carry out some keenly desired project of his own by the help of addition, and then help him to learn it, than to introduce him forcibly to the subject, with repeated reference to the future use of that subject for him. For a detailed discussion of the way in which such methods may be, and have been, employed the reader is referred to Dewey's "School and Society," or Miss Woods' "Educational Experiments in England." The fact that they were learning for a very definite immediate purpose of paramount and vital importance was very probably one of the factors in the enormously accelerated learning progress made by the recruits in training for the new armies in the war.

Many conscientious teachers, and more especially lecturers, feel that a large proportion of their efforts is wasted, without being quite clearly aware of the cause. If we suppose that the lectures or teaching are inherently good it may be that the matters under discussion do not actually meet a "felt need" of the students. Take, for example, lectures on the theory and psychology of education to students with no practical experience of teaching, and as a result no conception of the problems which will face them in their work. Most of the discussion is bound to go clear over their heads, through no fault of their own, and indeed many of my former students have come to me after quite a short experience in teaching and said that if they had only known what the problems and difficulties would be they would have been much more interested in the matters discussed in the lectures. In fact, instead of having to exercise their memories for examination purposes they would probably have done a little thinking, with much better results to all concerned. At any rate, the classes would have been undoubtedly more stimulating to the lecturer.

CHAPTER II

A PSYCHOLOGICAL BASIS FOR SCHOOL DISCIPLINE

THE general problem of moral education and the more specific one of school discipline belong in the first place to the field of ethics, and psychology can only give an indication of some of the most probable underlying general factors and draw inferences as to the methods which are most likely to prove successful if we take into account some of the innate tendencies involved. There have been a great many attempts to work out the connexion between the innate tendencies and the problem of moral control, but since MacDougall's theory, as outlined in his "Social Psychology," Chapters V IIf., seems to agree best with the observed conditions, this chapter is a summary of his theory of the four levels of moral control, with a few of the practical rules which may be deduced from it.

These four levels may be briefly described as:

1. The prudential level.
2. The authoritative level.
3. The social level.
4. The personal level.

The individual gradually attains these various levels without at the same time ceasing to be controlled by the lower levels through which he has passed. Further, the formation of the concept of the self is closely bound up with this moral development. At the first or prudential level the individual's conduct is controlled solely by fear of the resultant painful effects of misconduct, and the agents of control are the objects of his environment, which as yet have not been differentiated as persons or things, but are merely lumped as a whole as external to the self, which is thus beginning to be distinguished from the environment. In the second or authoritative stage persons are beginning to be differentiated from things, and conduct is now controlled by rewards and punishments administered by persons, and usually by those who are felt to be superiors. In the third or social level conduct is controlled by the expectation of praise or blame, and in this case the agents are not necessarily superiors but may be equals. This is the stage at which the influence of public opinion is most felt, and also where the consciousness of the self as a member of the group first becomes very active. All these three stages are examples of external control, and as a result wrong-doing in itself will not necessarily be inhibited by them, except in the case of the likelihood of being found out. The fourth stage, which MacDougall considers is only to be reached after passing through the other three levels, is, on the contrary, a case of internal control. At this level an individual's conduct is controlled by the attempt to conform to some personal ideal which he has set up for himself. He no longer refrains from a certain line of conduct because his associates would consider it wrong, but may even in many cases act in direct opposition to public opinion in order to conform to his own ideal. Very few individuals attain to this fourth level, but it should nevertheless be the ideal at which we should aim in all our attempts at moral education.

If we accept this as a true outline of the moral development of an individual, then we may immediately draw some conclusions with regard to the best means of moral education. In the early stages of its development the child should be allowed to suffer the natural consequences of its acts, at least in so far as these are not likely to prove fatal or too harmful to the child. This is the method advocated by Rousseau, and after him by Spencer, for the whole period of the child's education. But if we accept MacDougall's statement, we see that this is only the initial stage in moral education and represents a comparatively low level. Gradually the child must be made to feel the force of external authority in his dealings with his superiors. But this stage, again, must not be regarded as the final stage, as it unfortunately is in far too many cases. The saying that a child should be seen and not heard may be regarded as the slogan of those who believe this to be the goal of a successful educational system. But this stage must lead as soon as possible to the still higher stage where praise and blame are active. The influence of a child's equals is allowed to be felt in any scheme whereby a certain amount of self-government is allowed to the children. But again, the only too well-known case of the person whose conduct is entirely controlled by the standards of "good form" and "bad form" cannot be considered as the ideal type to result from our system of education. Such a person is always in a state of servility and dependence towards public opinion. In connexion with the discipline of the school or the class the last stage makes the hardest demands of all on the teacher, since it calls for an almost complete resignation of his authority over his pupils. But the true teacher will never be satisfied unless his pupils are able to reach a stage in advance of his own as a result of the foundations laid down by his teaching. One thing that a teacher may do which will have a great influence on his pupils when they finally reach this fourth stage of complete independence is to place before his pupils a sufficient variety of ideals, so that the pupil will not be unduly restricted in his choice. Recent attempts to introduce the biographies of famous scientists, philosophers, artists, and the like into the school curriculum are examples of this desire to widen the pupil's field of choice for personal ideals beyond the previously limited sphere of famous statesmen and soldiers.

One point that must be emphasized is that the child must himself experience each lower level before he can pass to the higher. Thus no amount of mere instruction will avail, but direct training must be given where the child himself acts and experiences the results of his actions. This direct training may be supported by instructional methods, but without the direct experience no amount of telling will achieve any real results.

Another point to be borne in mind is that although these various stages of moral control have been given as successive in appearance, it does not follow that the lower stages disappear on the appearance of the higher. On the contrary, all the lower stages continue to act to a certain extent throughout the life of the individual. Thus even an adult who has reached the highest stage of ideal control will still refrain from walking over a precipice or stepping on to the street in front of a motor-car from prudential motives.

Again, as a rule he will usually tend to obey legal and other forms of authority in such matters as the payment of taxes and the clearing of snow from the pavement, if for no higher motive than the desire to be undisturbed in the pursuit of his ideal. Also, in the majority of cases he will conform to public opinion, at least to a certain extent, in such conventional matters as dress and the minor courtesies. Thus the system of control of the actions of anyone who has attained to the ideal stage is very complex, and represents very often a state of conflict between the various levels of control, although if the individual takes as his final court of appeal the ideal level, then, in any case where there may be a conflict between this and a lower level, the highest level will exercise the decisive influence.

Many, if not most, teachers with experience of the difficulties of discipline under the customary authoritative system may argue with apparent justification that if, as is well known, it is difficult to manage a class even when a very firm hand is kept over them all the time, one would expect it to be almost impossible to have any order at all in a class which was given as much freedom of self-control as is indicated here. And the longer the teacher's experience the more would he be convinced of the truth of this argument. But, on the other hand, it may just as well be argued that a great deal of the trouble of disorderly conduct of the children was due to the unnatural character of the system itself, and represented the children's expression of a desire for a more natural system in which they were allowed a certain share in the control of their own conduct in proportion to the extent to which they proved themselves capable of using it rightly. The only final answer to such a problem is to be found in terms of what should be the motto of all experimental laboratories, if not of all schools and classes, " You can tell by trying." Such experiments as have been made in different schools seem to point to the very beneficial effects of allowing a certain proportion of self-control to the pupils, which may increase with age, but at the same time distinct caution is indicated in not attempting, as a result of undue enthusiasm for an ideal of freedom, to proceed at a more rapid rate than the natural development of the child warrants. If this is done, and the child is given greater scope and consequently responsibility than he is fitted to meet, chaos will probably ensue, and the last state of affairs be many times worse than the first under the other extreme of too great insistence on external authority.

Another reason for proceeding cautiously with the granting of self-control to children is the fact that if children are allowed to impose penalties on one another for infringements of any rules or laws which they may find it necessary to set up for the good of the community, it is almost invariably found that these penalties are much more severe than any outside authority, as the teacher or the head-master, would dare to impose. As a result the inadvertent transgressor is apt to receive punishment which by no means " fits the crime."

As an example of the way in which the device of self-government has proved successful with most unpromising material may be quoted Mr. George's[1] experiment in New York State with the George Junior Republic, or the Little Commonwealth set up in England by Homer Lane on the model of the Republic. In the course of his work in the slum districts of New

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[1] See George, Appendix B, 8.

York City, Mr. George became especially interested in the problem of gangs of young boys and girls who were a constant source of annoyance to the authorities. He came to the conclusion that the reason for their antisocial activities was that the environment did not give them a proper outlet for their energies and undoubted intelligence, and he tried the daring experiment of taking a number of them to an upstate farm and allowing them practically complete self-government. In the first place he began with something in the nature of a holiday home in the summer, but found that this had certain unsatisfactory features, mainly in the effect on the attitude of the children towards the various presents, such as clothes and the like, which they were given by well-wishers of the work. As a result he resolved to try the more elaborate experiment of establishing a community which went on all the year instead of merely in the summer time. Boys and girls from twelve to sixteen, whose usual environment was considered unsatisfactory, were eligible as members of the community. In some cases they were young people who had come as first offenders before the New York juvenile courts, but it is also of interest that a few were children from quite wealthy families whose home environment would tend to prevent them from realizing the connexion between work and money. There was established a special system of coinage for the use of the community, and each member was paid in accordance with the work he or she did; and there were a series of bungalows and dining-rooms in which the quality of the accommodation and food varied in accordance with the capacity of the individual to pay. If anyone refused to work, then he or she found himself very soon brought up before the court of his fellows and committed to prison under the charge of one of the boys who had been appointed jailer, and here he had to work for the barest necessities of life at prescribed work without any further reward. As a result he very soon came to the conclusion that it was better to work for himself and earn a little money above the merest subsistence minimum. A certain proportion of the time was given daily to school work, with the interesting feature that such work was paid for in the same way as any other kind of work. Since " Daddy " George, as he was usually called, did not want any young people who were innately mentally defective in his community he asked Professor Whipple, of Cornell University, which was only about eleven miles distant, to apply Binet tests to the boys and girls, and their work in this connexion was also paid for. In one case an interesting sidelight on the government of the place was cast, when at the end of a day's testing one boy remained to be tested after school-hours, and we asked if we might have him for half an hour to be tested, the teacher referred us to the jailer since this boy was out on parole from prison in order to attend school, and we would have to obtain an extension of his parole, which we did by asking the boy who was for the time the jailer. It was very interesting to watch the gradual change in attitude from the case of the newly entered boy or girl and the older inhabitants. Sometimes a new-comer fresh from a city gang would steal something and proceed to boast about it as an achievement. When he met stony silence instead of the customary gleeful approbation of the gang the new environment began its work, in the form of general public opinion, which was further formally expressed by the sentence of the court of his peers which would speedily follow on the very next Friday night at the weekly meeting of the court.

Of course everything did not proceed with absolute smoothness, and several pieces of hasty legislation had to be repealed in the light of hard-won experience. The most interesting case was the attempt to establish an eight-hours' day. This was very short-lived when the boys, on coming back from the harvest at four p.m. after eight hours' work, found that there was no dinner waiting for them since the girls, who had begun work at six a.m., had gone off for a picnic in the woods promptly at two p.m.

In evidence for the correctness of Daddy George's hypothesis with regard to the part played by environment in these cases it may be mentioned that quite a number of boys who have passed through the Junior Republic are now out in the greater Republic making a name for themselves as prominent law-abiding citizens, whereas they might under other circumstances have graduated from the leadership of a gang to which their intelligence would have promoted them to some form of antisocial activity in the under-world of the great city, with a lengthy police record to their names. One point of interest is that the lower age limit set for entrance made it reasonably likely that the members were ready for self-government.

The practical consequences of the four levels of moral control are seen mainly in the types of discipline which have the greatest chance of success at the various ages in the school. The first practical rule which may be safely deduced is that there is no one method of discipline which may be expected to be equally successful at all ages. Thus for the very young child of pre-school age the best results would be expected from allowing the child to suffer the natural consequences of his actions in so far as these are not too dangerous. By the time that most children come to school a certain amount of authoritative law-making ought to be best, but in this case the laws should be as few as possible, and only those should be made which are certain to be observed without any exceptions.

About the middle of the school period the teacher must make allowances for the force of public opinion, unless he wishes to waste a large proportion of his efforts. Whether the teacher desires it or not, the opinion of the class will be a very powerful factor in influencing pupils in their "teens," and, if at this stage, the teacher tries to impose his authority on the class too much he will find himself working uphill against the stronger force of class opinion. If, on the other hand, he recognizes the presence of this powerful incentive and deliberately enlists it on his side he will find that to a large extent the problem of discipline will solve itself. The following may be quoted as a single application of this principle in connexion with the disciplinary problem of punctuality. Instead of scolding or punishing the pupils who persist in arriving late in the morning, it will be found to be much more effective to adopt the following method with older pupils. At the beginning of the session inform the class of the records for punctuality of the similar classes in the two previous years, and quietly suggest that the present class might attempt to improve on these records, and if necessary impose a nominal punishment for lateness. Then any pupil who dares to be late in the face of this situation will in all probability not care to repeat the experience, since apart altogether from the incidence of the punishment, he will at once feel the combined disapproval of his class-mates at the time of his entry into the class-room.

Once this general principle has been successfully established the matter is practically taken out of the teacher's hands and he can devote his energies to the far more important problems of teaching. Such a system will also be much better for the pupils in that it gives them an opportunity for actual training in the exercise of this natural tendency on the side of the law instead of against, as is otherwise so likely to be the case. But however helpful and beneficial this third method may be, it should not be regarded as the final aim. The establishment of certain school traditions which are capable of adoption by individual pupils as their own ideals is but one example of the way in which an attempt may be made to facilitate the transition from the social to the ideal types of control, and the securing of a control which may be expected to continue to function after the individual has left school. But, again, it is not safe to assume that this type of control is really operative until the individual has reached the stage of adolescence.

CHAPTER III

ADOLESCENCE [1]

MOST of the points discussed in this chapter have been dealt with incidentally in connexion with the various topics considered in the earlier chapters, but the special interests of secondary teachers, and also the new problems which are raised as a result of the proposals to raise the age for compulsory education, justify a specially grouped treatment of the psychology of adolescence. The question of the effect of the distribution of intelligence at this stage will be discussed, but more stress will be laid on the very important general change of attitude which seems to occur at this period in the youth's development.

In the first place, it must be noted that the term "adolescence" is applied to the stage in the growth of the child when he or she passes from the immaturity of childhood to the maturity of manhood or womanhood. At this time there is a revolutionary change in the fundamental physiological condition of the organs of reproduction with a consequent change in the total array of bodily appetites. At the same time there appear certain so-called secondary changes, such as the growth of the beard and the breaking of the voice in the boy. On the psychological side there is a corresponding rise in importance of the sex instinct. Whether we regard this instinct as having been completely latent in the earlier stages and now for the first time making its appearance or becoming nascent, or if we adopt the more recently advanced view of the presence of the sex instinct from a very early age, there can be no doubt that the relative prominence of this instinct as a driving power behind the individual undergoes a drastic change at adolescence, and it is this change that is of importance from the point of view of education. Just as there are secondary physiological changes, so there are secondary psychological characteristics, which show change along with the sex instinct itself, and the knowledge and utilization of these secondary characteristics is of great value to the teacher of the adolescent boy or girl.

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[1] For fuller details of this topic, see Hall, Appendix B, 11; Slaughter, "Youth"; or Whipple, Appendix B, 31.

There is no set age at which it can be said that all boys and girls have passed the stage of adolescence, but, on the contrary, there is a span of about four or five years during which boys and girls may be either before, at, or after adolescence, or puberty, and thus any age group between 12 and 16 will be a mixed group as far as sexual maturity is concerned. There is also a sex distinction in that girls, on the average, mature earlier than boys. As a result of this spread in the onset of adolescence we cannot take any administrative measures to allow for it on the basis of dealing separately with children above and below a certain fixed age, with a view to differentiating our instruction and methods in accordance with the physiological and psychological differences before and after adolescence. The term "physiological age" has been suggested to indicate the stage of development reached by the youth with regard to sexual maturity, and also the division into pre-pubescents and post-pubescents as distinguishing the immature child from the mature young man or woman.

But, leaving aside for the moment all question of the physiological age of the children in their teens, we are faced with a difficulty of classification on the basis of mental age. In the first place, if we assume that the intelligence quotient or the ratio of the mental to the chronological age of a child remains nearly constant, then it necessarily follows that the spread of mental ages increases with increasing age. In other words, a child of 6 with a mental age of 4, and as a result an I.Q. of 0·66, will become at the age of 12 a child of mental age 8, and so on. In the second place, we have the further disturbing factor that children of lower mentality are gradually reaching their maximum possible mental age, beyond which they will never develop. Thirdly, just as there are irregularities in physical growth before and during adolescence, there would seem to be periods of slowing up and spurting in mental development at this time. Since the onset of adolescence varies with individual children, so will these two periods of variable rate of development. As a result of this the relative standing of the pupils in a class will be apt to change in rather a puzzling way just at this age. But if the teacher recognizes that this is only temporary, the difficulty will usually be cleared up when the children get back to their normal rate of development. When a little more definite information is available as to the mental age of each child in a class, as we hope it will soon be, then the teacher will have some basis for estimating whether a child is working up to his or her capacity, and also at about what stage he may expect any child to reach the limit of its intellectual development.

These factors have as a practical result the impossibility of devising a uniform course for all the children, at this stage, however possible an approximation thereto may have been at the earlier stages of the primary school. Investigations of the distribution of intelligence in the adult population, such as the recent American Army tests, show that there is quite an appreciable residuum of the population who never progress beyond the mental age of ten, and it is obviously a ridiculous waste of time and effort to try and drive such people through the ordinary course of our secondary schools. But if we insist on the continued compulsory education of such people up to the age of 15 or 16 without considering their mental age, it is obvious that some other scheme of training must be devised to meet their needs. It has been found that there are certain trades in which people of lower grades of intelligence may hope to attain to a reasonable degree of success. If we were to make a rough classification of our school population into about three or five grades of intelligence, and then find for each of these grades the group of suitable careers, we could then give the pupils in each grade a pre-vocational training suited to the possible trades, and at the same time allow them a certain freedom of choice among the trades in their own group. This would be one way of avoiding the very large number of misfits which occur at present, and at the same time would tend to provide a training more suited to the stage of intellectual development of the individual child, with the result that he would probably be more interested in it and less likely to be left entirely out of his depth. If properly administered such a scheme would undoubtedly contribute substantially to the sum total of contentment among the general body of the pupils in our secondary and higher grade schools, and ultimately to the contentment of the adult population as a whole. There have been suggestions that the general change of attitude at the stage of adolescence may also cause a fundamental change in the manifestations of intelligence, but this still awaits definite experimental proof.

The author does not wish the above statement to be taken as an argument for the entire abolition of the predominantly literary course as at present in vogue in our schools, but only as a plea for the selection on the basis of intelligence of those pupils who may be fit to profit by such a more abstract course, and the provision of parallel courses fitted to the needs of the remainder who are inherently incapable of profiting by the standard type of curriculum. The question of the possible alteration of the standard curriculum must be discussed on another basis altogether, and is indeed more a question for the sociologist than the psychologist, depending, as it does, on the ultimate aim of society.

We must now deal with the far more important question of the changes in the driving forces, or "horme," as Professor Nunn calls them, which are at the back of the mental activity of the adolescent. The primary change is, of course, in the relative predominance of the sex instinct itself. In this connexion a very important change is taking place in regard to the general attitude towards the subject. Until recently the so-called "policy of silence" was adopted with very far-reaching results, but now the attitude of the younger generation is one of open and frank discussion, where the whole matter is considered on a more or less objective basis. This change is all in favour of the educator, since it makes it much easier for him to dispel the appalling state of ignorance and misinformation which existed under the older regime. But it also has a much deeper effect in the production of a healthy attitude towards the question of sex, since it removes certain repressive tendencies which were almost universally prevalent, and prevents the formation of the so-called "complexes" of the Freudians which have such a baleful influence on the mental life of the individual, and which account for a large proportion of the morbid mental states at the stage of adolescence.

The best practical solution of the difficult problem of sex-education would seem to lie in the objective treatment of the function of the sex organs along with the general treatment of biology, or nature study, or whatever takes its place in the curriculum at an age when the children can deal with it without undue self-consciousness. Thus, instead of confining the attention to the breathing and digestive systems of plants and animals and leaving the question of reproduction untouched, a far better attitude would be developed by treating all in the same objective fashion. In this way the child at the stage of adolescence would no longer be dependent on misinformation picked up from very unreliable sources, nor would he or she be subject to the terror and shame which many children experience at the first manifestations of maturity in their own bodies.

But once this primary sex instinct has been put on a more healthy and normal basis there are a number of very interesting secondary modifications which influence the educative process in a fundamental fashion at this stage. Some of the factors mentioned here still await strict experimental proof, but there seems to be a high degree of probability of their existence. Thus the migratory instinct, or the wanderlust of the Germans, would seem to be especially active at this time, and may have a biological basis in the migration of animals at the breeding season. In a school system, where there is no scope for an outlet for this tendency, there is likely to result a large proportion of truancy. But if some such means as school excursions or rambles of nature study clubs, or regional survey, or the like are provided to meet this need, it may then be used as a direct ally of the teacher instead of being a hindrance, as in the case of truancy. Another secondary change at this stage is the marked development in the gregarious or herd instinct. The most striking indication of this change is shown in children's games. Before adolescence children prefer games where it is a case of each one for himself, while after adolescence team games become the favourites. Thus, for example, when young children play cricket they all want to have the star parts, and if it were possible would like to be at one and the same time the bowler, batter, and fielder who makes the brilliant catch. It is only at the later stage that the child is content to play for his side, even although there naturally remains a certain proportion of desire for personal glory. While this factor is allowed full play in the playing field, it might be brought into much greater prominence in connexion with the work of the school at the later stages, by allowing co-operation to replace individual competition to a large extent. Or, again, interclass competition might be made more use of in connexion with studies as well as with play. Another result of this changed attitude is that the child ceases to be so self-centred, and develops in many cases an almost exaggerated degree of altruism, and at this stage the child's mind is ripe for the establishment of ideals of service. But not only does the child tend to think more of others but he is also more sensitive as to what his fellow-pupils think of him, and as a result the form of discipline should be changed from one based on the superior authority of the teacher to one based on the opinions of the pupils themselves. This is the time at which it is not only safe but necessary to introduce an increasingly large proportion of self-government into the classes. The teacher should take up the fraternal rather than paternal attitude towards his pupils.

But by far the most important reason for continuing some form of education through the period of adolescence and not leaving the child too much to his own devices lies in the fact that at this time the child is an idealist, with his eyes turned to people either in his immediate environment or in the literary and historic environment which his schooling has built up for him with a view to selecting some ideal which shall consciously or unconsciously influence his actions and opinions in after-life. If rightly and tactfully guided at this stage the child can be very fundamentally influenced for good. If his previous teaching has drawn attention not merely to kings, statesmen, and warriors in the past, but also to successful men in other walks of life, then a broader basis for choice of an ideal will be open to the youth. In some schools an attempt is being made to indicate the possibilities in different types of careers at this stage by means of talks by prominent men in the various trades and professions, and more recently still by the use of cinematograph films showing the processes involved in different trades. Not so very long ago a child growing up in the average community had ample opportunities of direct observation of all the processes which went to constitute the majority of the available occupations in his environment, but nowadays specialization and industrialization have progressed to such an extent that it is practically impossible, except by some such indirect means as lectures and cinemas, to let the youth who is about to leave school obtain even the vaguest ideas as to the nature of work required in the different vocations.

Another very important result of this idealistic tendency is that it may find its outlet in the enthusiastic adoption of some line of study, as a result of which the youth when he leaves school will have some internal incentive to continue his studies and hence his education, which is in so many cases of early graduation from school so sadly lacking. In this way we would not merely gain the addition of one or two years to the time of the educative process, but might manage to prolong it for many years into the adult life of the individual.

It is also suggested, but as yet not definitely proved, that the attitude of children towards instruction undergoes a change at adolescence. The pre-pubescent prefers to receive instruction on the basis of authority, while the post-pubescent desires to know the reason for everything. Thus, in the case of the arithmetical extraction of the square root, the younger child prefers to be given a mechanical rule, which he can carry out, so long as it gets the desired result; but, on the other hand, the child who is post-pubescent is not to content accept the rule on the teacher's authority, but wishes to be told why he does it in the particular way required.

If some of the above distinctions actually hold in general between the children before and after adolescence, then the plan suggested by Dr. Ward Crampton, of New York,[1] for a parallel classification on the basis of physiological age would certainly seem to tend to produce more uniform classes. Thus at the teens we could first classify our pupils in successive forms or grades according to their age, or, rather, to be up to date in accordance with their mental age, and then we could divide each form into two parallel classes, with the pre-pubescents in one and the post-pubescents in the other. In order to render transfer possible for each boy or girl as he or she passes through the adolescent stage, it would be necessary to keep the programmes of instruction as far as regards subject-matter uniform with one another, but the method of handling the subject and disciplining the class would differ in accordance with the attitude of the children. Thus on the pre-pubescent side both the presentation of the matter and the discipline would be of an authoritative nature, while on the post-pubescent side the children would pay more attention to the reasons behind the presentation, and the discipline would be more fraternal than paternal and would indeed be more and more in the hands of the children themselves.

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[1] See Whipple, Appendix B, 31.

CHAPTER IV

CONCLUSION

BECAUSE of the order of presentation of the material in this book, it might at first sight seem that heredity was the all-important factor in education; but in the development of the discussion of the educative process the part played by environment has come more and more to the front. It may be summed up as the provision of ideals and outlets for the innate and acquired tendencies of the individual. Environment can in no case supply what is lacking by heredity in the way of capacity, but it does provide it with a very varied possibility of development. Whatever the environment may be, the only sure means of development is along lines of the child's own activity under conditions of ever-increasing freedom as he proves himself fit to benefit by it.

APPENDIX A

VOCABULARY TEST FOR USE AS A GROUP TEST

IN this appendix are included the test blank, a key indicating the solutions considered correct, and a table summarizing the results of applying the test to over 900 boys and girls between the ages of 8 and 14 in various Scottish schools, both in Edinburgh and elsewhere. In this table the results are tabulated according to age and sex. In the first column are given the ages; in the next three columns the figures for the boys: (*a*) the number of cases tested at each age, (*b*) the median or middle score, and (*c*) the semi-interquartile range Q to indicate the variability of the scores at each age. The next three columns contain similar figures for the girls, and the last two columns give the median and Q for each age irrespective of sex. To indicate what these figures mean let us take those of the 10-year-old boys. There were 83 who tried the test. After they had been scored and placed in order it was found that the forty-second, or middle boy, had a score of 20 out of a possible 50, and it was also found that by taking the range from 20 − 4 = 16 up to a score of 20 + 4 = 24, half the boys were included and one quarter were above 24 and one quarter below 16.

The medians for all show a fairly regular progress with increase of age, and also a fairly constant spread at each age, as indicated by the fact that in all cases Q is either 4 or 5. On comparing the sexes it will be seen that the youngest boys tend to be better than the girls, but by the time we come to 12 the girls tend to be slightly better than the boys.

As an indication that this test may also be used with older students it may be mentioned that the second-year students at Moray House (average age 19–20) had a median score of 39, and a selected group of university graduates a median of 45.

VOCABULARY TEST

Name .... *Sex* ....
Class ......
School .... *Age* ....

In each line look at the first word, and then draw a line under *the one word of the last four that fits the first word best.*

If you do not know the first word cross it out, and go on to the next line.

gown is a - - - flower, dress, food, book - -
tap is used for - - clothes, water, noise, beast - -
scorch is - - - burn, yell, chew, run - - -
puddle is - - - hard, loud, wet, moving - -
envelope is for a - - house, letter, bed, animal - -
rule is to - - - scold, hurt, lead, draw - -
health is being - - rich, well, clever, happy - -
eyelash is - - - hair, skin, fat, bone - - -
copper is - - - animal, food, barrel, metal -
curse is - - - - swear, bless, mend, praise - -

pork comes from - - cow, sheep, pig, calf - - -
outward is a - - direction, size, ship, time - -

southern is a	star, position, flower, climate
lecture is	running, writing, mixing, talking
dungeon is a	parlour, prison, hill, animal
skill is	cleverness, quietness, place, height
ramble is a	berry, egg, walk, struggle
civil refers to	army, city, nation, politeness
insure is to	provide, lose, speak, die
nerve is for	stretching, feeling, frightening, strengthening

juggler is	animal, vein, performer, vessel
regard means	respect, watch, last, fight
brunette refers to	biscuit, girl, flower, bear
hysterics refers to	medicine, joke, history, fit
Mars is a	star, game, god, war
mosaic refers to	flower, design, moss, language
bewail means	mourn, hurt, thrash, roar
priceless means	worthless, useless, precious, wasteful
disproportionate refers to	weather, colour, magic, size
tolerate is to	tax, allow, carry, endure

artless means	artificial, inartistic, simple, ugly
depredation is	blaming, plundering, lowering, losing
lotus is a	flower, insect, fish, stone
frustrate is to	truncate, finish, think, hinder
stave refers to	music, dagger, barrel, theatre
harpy is a	instrument, monster, mineral, minstrel
flaunt involves	display, anger, trickery, deception
ochre is a	monster, ribbon, colour, area
milksop is a	dairy, weakling, cheat, food
incrustation is a	bread, varnish, scum, coating

retroactive refers to	backward, different, stagnant, repeating
ambergris is a	rust, pipe, perfume, jewel
achromatic refers to	music, colour, odour, athletics
perfunctory is	lasting, emphatic, scented, careless
casuistry refers to	conscience, chemistry, accident, scepticism
piscatorial refers to	painter, angler, aquarium, hunter

sudorific refers to	sleep, south, smell, sweat
parterre refers to	building, fraction, gardening, mining
shagreen is	leather, annoyance, rubber, grief
conspiracy means	breathing, sailing, thieving, plotting

The following answers are counted correct:

gown	dress
tap	water, noise
scorch	burn
puddle	wet
envelope	letter
rule	lead, draw
health	well
eyelash	hair
copper	metal
curse	swear
pork	pig
outward	direction
southern	position
lecture	talking
dungeon	prison
skill	cleverness
ramble	walk
civil	nation or politeness
insure	provide
nerve	feeling
juggler	performer
regard	respect
brunette	girl
hysterics	fit
Mars	god
mosaic	design
bewail	mourn
priceless	precious
disproportionate	size
tolerate	allow or endure
artless	simple
depredation	plundering
lotus	flower
frustrate	hinder

stave	barrel or music
harpy	monster
flaunt	display
ochre	colour
milksop	weakling
incrustation	coating
retroactive	backward
ambergris	perfume
achromatic	colour
perfunctory	careless
casuistry	conscience
piscatorial	angler
sudorific	sweat
parterre	gardening
shagreen	leather
conspiracy	plotting

VOCABULARY TEST: SUMMARY OF RESULTS

Age	BOYS			GIRLS			ALL	
	Number of Cases	Median	Q	Number of Cases	Median	Q	Median	Q
8	41	14	5·5	54	12	4·5	13	5
9	70	17	4·5	72	19·5	3·5	18	4
10	83	20	4	94	21	4·5	21	4
11	84	26	5·5	92	23	3·5	23·5	4
12	82	28	5	110	30	5	29	5
13	66	30	3	61	33	5·5	31	4

APPENDIX B

BIBLIOGRAPHY

1. Bagley, William C.: "The Educative Process." Macmillan, N.Y., 1905.
2. Burt, Cyril: "Mental and Scholastic Tests." London County Council, P. S. King, 1921.
3. Colvin, Stephen S.: "The Learning Process." Macmillan, N.Y., 1914.
4. Dewey, John: "How we Think." (An analysis of the thought process and a plea for the development of the scientific attitude of mind as a result of our educational efforts.) Heath, Boston, 1910.
5. Dewey, John: "School and Society." University of Chicago Press, 1915.
6. Drever, James: "Introduction to Psychology of Education." Arnold, 1922.
7. Freeman, Frank N.: "The Psychology of the Common Branches." (Handwriting, drawing, reading, music, spelling, history, geography, mathematics, and natural sciences.) Riverside Textbooks in Education. Houghton Mifflin, Boston, U.S.A., 1916.
8. George, W. R., and Stowe, L. B.: "Citizens Made and Remade. An Interpretation of the Significance of George Junior Republic." Constable, 1913.
9. Goddard, Henry H.: "The Kallikak Family." Macmillan, N.Y., 1912.

10. Goddard, Henry H.: "Psychology of the Normal and Subnormal." Kegan Paul, 1919.

11. Hall, G. Stanley: "Adolescence." Appleton, 1904.

12. Hingley, R. H.: "Psycho-Analysis." Methuen, 1921.

13. Huey, Edmund B.: "The Psychology and Pedagogy of Reading." (With a review of the history of reading and writing and of methods, tests and hygiene of reading.) Macmillan, N.Y., 1909.

14. James, William: "Talks to Teachers on Psychology." Longmans, Green & Co., 1920.

15. MacDougall, William: "Social Psychology." Methuen, 1908.

16. Meumann, Ernst: "The Psychology of Learning." (An experimental investigation of the economy and technique of memory.) Translated by John W. Baird. Appleton, 1913.

17. Miller, Irving E.: "The Psychology of Thinking." Macmillan, N.Y., 1909.

18. Montessori, Madame: "The Montessori Method." Heinemann, 1912.

19. Nunn, T. Percy: "Education; Its Data and First Principles." Arnold, 1920.

20. Rugg, H. O.: "The Experimental Determination of Mental Discipline in School Studies." Warwick and York, Baltimore, U.S.A.

21. Rusk, Robert R.: "Experimental Education." (Includes a summary of the main points of Meumann's "Vorlesungen zur Einfuhrung in die experimentelle Paedagogik," 3 vols., Engelmann, Leipzig, 1911–14; with the addition of examples chosen from investigations in British schools.) Longmans, Green & Co., 1919.

22. Starch, Daniel: "Educational Measurements."

(A summary of standardized scales for measuring progress in school subjects.) Macmillan, N.Y., 1916.

23. Starch, Daniel: "Educational Psychology." Macmillan, N.Y., 1922.

24. Stern, William: "The Psychological Methods of Measuring Intelligence." Translated by Whipple. Warwick and York, Baltimore, U.S.A., 1913.

25. Terman, Lewis M.: "The Measurement of Intelligence." (An explanation of and a complete guide for the use of the Stanford revision and extension of the Binet-Simon Intelligence Scale.) English edition. Harrap, London, 1920.

26. Terman, Lewis M.: "The Intelligence of School Children." (How children differ in ability, the use of mental tests in school grading, and the proper education of exceptional children.) English edition. Harrap, London, 1921.

27. Terman, Lewis M., and others: "The Stanford Revision and Extension of the Binet-Simon Scale for Measuring Intelligence." (A summary of the data on which the revision and extension were based.) Educational Psychology Monographs, No. 18. Edited by Whipple. Warwick & York, Baltimore, U.S.A., 1917.

28. Thorndike, Edward L.: "Educational Psychology." Teacher's College, Columbia, 1913.

29. Titchener, Edward B.: "A Beginner's Psychology." Macmillan 1915.

30. Whipple, Guy M.: "Manual of Mental and Physical Tests." Part I: Simpler Processes. Part II: Complex Processes. (A book of directions compiled with special reference to the experimental study of school children in the laboratory or classroom.) Second edition, revised

and enlarged. Warwick & York, Baltimore, U.S.A., 1914–15.

31. Whipple, Guy M.: Article on Adolescence in Paul Monroe's "Principles of Secondary Education." Macmillan, N.Y., 1914.
32. Woods, Alice: "Educational Experiments in England." Methuen, 1920.
33. Woodworth, Robert S. "Psychology." Methuen, 1922.
34. Yoakum & Yerkes: "Mental Tests in the American Army." Sidgwick & Jackson, 1920.

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